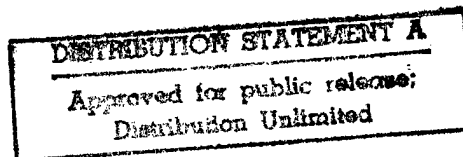


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22 June 1984

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LIFE SCIENCES
BIOMEDICAL AND BEHAVIORAL SCIENCES

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UDC 633.16"321":631.527:631.525

PRACTICE IN USE OF GREENHOUSES

Moscow SELEKTSIYA I SEMENOVODSTVO in Russian No 3, Mar 84 pp 21-23

MAKRUSHIN, N. M., KOSOV, Yu. A., KHIMICH, V. M. and BORETS, A. M.

[Abstract] The overall plan and elements of the plan developed at the Moscow Scientific Research Institute of Wheat Selection and Seed Growing to accelerate spring barley selection are described and discussed. The process combines field and greenhouse cultivation of selection material in order to shorten time required to carry out individual steps of the process. A photo-thermal regime which accelerates production of yields of selection material in a greenhouse is described. Optimum conditions for growing the selection materials in a greenhouse are discussed. Parameters of a model of a spring barley variety developed at the institute are presented and discussed.
[1035-2791]

UDC 633.11"324":631.524.85

ACCELERATED EVALUATION OF DROUGHT RESISTANCE OF SELECTION MATERIAL

Moscow SELEKTSIYA I SEMONOVODSTVO in Russian No 3, Mar 84 pp 23-25

MAYMISTOV, V. V., OSIPOV, Yu. F., CHUMAKOVSKIY, N. N. and YEVTUSHENKO, Yu. V., Krasnodar Scientific Research Institute of Agriculture imeni P. P. Luk'yanenko

[Abstract] An automatic drying system used at Krasnodar Scientific Research Institute of Agriculture since 1972 to evaluate drought resistance of winter wheat selection material is described and discussed. The dryer used consists of a greenhouse structure (glass covered area 48 m²) which moves on rails over three ground plots. Twenty samples of winter wheat, sown on 0.33 m² plots in 4 repetitions for each section are studied yearly in the dryer. Results of these studies are discussed. The dryer makes it possible to simulate soil dryness in any period of plant development and to regulate the temperature regime on sowings and thus permits more careful and complete study of drought resistance of selection material. Figure 1.
[1035-2791]

RESULTS OF EXPERIMENT CARRIED OUT UNDER ARTIFICIAL CLIMATE CONDITIONS

Moscow SELEKTSIYA I SEMENOVODSTVO in Russian No 3, Mar 84 pp 25-27

MIRONOVA, T. P., SVIRIDOVA, T. Ye., GRIB, S. I. and DANILOV, A. S.

[Abstract] Experimental studies of Zhodinskiy 21 spring barely grown under different conditions of artificial climate were described and discussed. Productivity of the variety was found to be directly proportional to the illumination level in the experiments and protein level was in inverse proportion to illumination level. Analysis of fractional composition of the grain protein showed almost complete absence of variation of levels of albumin and globulin, prolamines and glutelins and slight deviations of all fractions from the corresponding quantity in field-grown grain. It was found that in all varieties of the experiment the quantity of irreplaceable amino acids and their total varied only slightly. Assessment and selection of both selection material and hybrid material for protein content and grain weight during growing under artificial climate conditions may be carried out for average samples but not for individual plants.

[1035-2791]

INVESTIGATION OF SOME PROPERTIES OF IMMOBILIZED ALDOLASE

Kiev UKRAINSKIY BIOKHMICHESKIY ZHURNAL in Russian Vol 56, No 2, Mar-Apr 84
(manuscript received 6 Oct 83) pp 194-197

KOZLOVA, N. Ya., MEL'NICHENKO, I. V. and YASNIKOV, A. A., Institute of Organic Chemistry, UkSSR Academy of Sciences, Kiev

[Abstract] Kinetics from rabbit muscle of fructoso-1,6-diphosphatealdolase immobilized on sephadex G-200 was investigated. The immobilized aldolase could be stored at 5-10°C for up to 6 months without losing its activity. The activity of immobilized aldolase was 14-23% of the starting free material's activity. An aliquot of immobilized aldolase could be used repeatedly without changing its activity. Even 4 and 8 M urea solution did not especially change the activity of this enzyme. The rate of direct and reverse immobilized aldolase reaction had an optimal pH value at 6.7. It retained its activity even in presence of sulfhydryl inhibitors: p-chloromercurybenzoate and iodoacetate. Figure 1; references 7: 1 Russian (by Western author), 6 Western.

[514-7813]

UDC 579.64:592

EFFECTS OF SURFACTANTS ON INVERTEBRATES

Kiev GIDROBIOLOGICHESKIY ZHURNAL in Russian Vol 19, No 5, Sep-Oct 83
(manuscript received 24 Dec 81) pp 84-90

MALYAREVSKAYA, A. Ya. and KARASINA, F. M., Institute of Hydrobiology, Ukrainian SSR Academy of Sciences, Kiev

[Abstract] In view of the increasing problems of surfactant pollution of freshwater bodies, an evaluation was made of the physiological effects of sodium alkylmonosulfate (E-30) and methyloxypropylcellulose (MOPC) on two freshwater hydrobionts: the crustacean *Dikerogammarus vilosus* and the mollusc *Planorbarius corneus*. Evaluation of the effects on enzymes involved in respiratory processes (succinate dehydrogenase, cytochrome oxidase) and energy metabolites (ATP, thiamine, inorganic phosphorus) demonstrated that the anionic surfactant--E-30--was a more toxic agent under equivalent conditions of concentration and time of exposure than MOPC. In addition, these studies also confirmed the greater susceptibility of the crustaceans to such chemicals vis-a-vis the molluscs. References 14: 12 Russian, 2 Western.
[531-12172]

UDC 582.26(26):664.8.037

PRESERVATION OF UNICELLULAR MARINE ALGAE *PLATYMONAS VIRIDIS* ROUCH AT LOW TEMPERATURES

Kiev GIDROBIOLOGICHESKIY ZHURNAL in Russian Vol 19, No 3, Mar-Jun 83
(manuscript received 8 Sep 80) pp 66-70

AYZDAYCHER, N. A., GOCHAKOV, V. M. and SILKIN, V. A., Pacific Ocean Scientific Research Institute of Fish Economy and Oceanography, Vladivostok

[Abstract] The goal of the present study was to investigate conditions of long term storage of *Platymonas viridis* Rouch, to determine optimal concentrations of glycerin and the range of storage temperatures assuring maximum viability of the algae cells after seeding on the nutrient medium. The most advantageous temperature for the preservation of algae was +7°C. Addition of glycerin up to a 5-10% concentration increased the viability of algae culture at a wide range of temperatures. Further increase in the concentration of glycerin does not improve the situation, so that a 5-10% concentration appears to be optimal. References 28: 17 Russian (2 by Western authors), 11 Western.

HOSTS OF CENTRAL ASIAN PLAGUE FOCUS

Moscow BYULLETEN' MOSKOVSKOGO OBSHCHESTVA ISPYTATELEY PRIRODY: OTDEL BIOLOGICHESKIY in Russian No 1, Jan-Feb 84 (Manuscript received 5 Sep 82) pp 3-12

[Article by L. A. Burdelov, I. Zh. Zhubanazarov, N. F. Rudenchik, A. Zh. Kuntuarov and V. F. Ten]

[Text] The problem concerning hosts located in natural plague foci, which has great theoretical and practical significance, could hardly be thought of as solved. The traditional concept dominating research on foci existing in our country is that single hosts prevail. Besides the scientific reasons behind this, the organizational convenience of working in a focus predominantly with a single object of study apparently played a major role in this as well. The concept that foci are characterized by single hosts is based on the idea that presence of one species of rodents--the main carrier of infection--is a necessary and sufficient condition for continuous circulation of the plague microbe in nature. All other species of mammals are given the role of extra "fuel," the participation or nonparticipation of which in the epizootic process is indifferent to the existence of a natural focus. There are serious difficulties in validating the truth of these assumptions, generated primarily by the extreme complexity of the focal occurrence of plague as a natural phenomenon. Among numerous epizootic events, we sometimes come across profoundly different facts which more or less persuasively confirm the views of the adherents of the single host and the multiple host character of natural foci. This is precisely the main reason for debate on this problem, debate that is still going on today. In this connection it is difficult not to agree with Soldatkin [20], who focused attention on the fact that in view of the multiplicity of the factors determining its development, every concrete plague epizooty has its unique features, ones which often overshadow the general characteristics of the epizootic process; therefore only a sufficiently large number of observations can reveal the basic laws inherent to the process as a whole.

Acquisition of such a sufficiently large number of observations is as a rule the stumbling block on the way to solving the problem of focal hosts, since it requires colossal outlays of labor and time, ones beyond the capabilities of the individual researcher. At the same time the plague control service has already accumulated an enormous amount of material describing the epizootic process in natural foci. However, systematization of this information and its

assimilation by conventional methods are encumbered by methodological difficulties. Thus the urgency of finding new approaches to utilizing archival information is obvious. This paper undertakes an attempt to comparatively analyze the abundance of small mammals in different periods of the course of epizootics in epizootic and nonepizootic areas of self-contained foci at the Sea of Aral, which represent the most active part of the Central Asian plague focus. In this case to evaluate the abundance of infection carriers we used not the results of special surveys but the average number of animals trapped at observation points. The novelty of this technique compels us to briefly dwell on the validity of its use.*

The greater gerbil is recognized universally to be the main carrier of infection in the Central Asian plague focus. This is why this species is the target of most mammal population counts conducted in epizootological surveys of plague foci. Population counts of rodents that respond to bait in "Gero" traps are also regularly conducted. However, owing to the use of small traps this method is suited only to determining the abundance of small mouse-like rodents, and it is insufficiently effective in work with animals of moderate size--lesser gerbils for example [3]. As far as other infection carriers are concerned, their population counts are usually made irregularly, they are not made everywhere, and different methods are employed. At the same time when the burrows of greater gerbils are subjected to trapping on a 24-hour basis--a mandatory element of epizootological surveying at the Sea of Aral, practically all homeothermic infection carriers are caught, making it possible to at least tentatively evaluate their abundance on the basis of change in the size of the catch [22]. A certain conservativeness that has existed for the last few decades in the methods of epizootological surveying, and also in the procedures of animal trapping, has had positive significance in this case. Moreover we make our population size comparisons not over periods of many years but rather within each concrete survey season, when a particular unchanging group of individuals does the trapping and when the work volume at all observation points is more or less identical. The species composition of animals trapped at each point is determined rather carefully, and a permanent record of it is kept in the working documents. All of this makes it possible to use materials covering dozens of years.

We compared the technique described here for estimating abundance with the trapline recommended by the existing instructions,** which use as their example the southern gerbil--one of the few species in relation to which such a test is at all possible. The results are shown in table 1, and they attest to the suitability of estimating abundance on the basis of catch size, in relation to the goals of our research.

* It was tested in application to the greater gerbil by Burdelov, and it provided interesting results (A. S. Burdelov et al., 1980).

**"Instructions on Recording Rodent Abundance for Plague Control Institutions of the Soviet Union," Saratov, 1978.

Table 1. Results of Determining the Quantity of Epizootic Areas Having a Larger Number of Southern Gerbils (in Comparison With Nonepizootic Areas) Using Different Methods of Estimating Quantity

Focal territory	Number of paired observations compared	Including with higher abundance in epizootic areas, assessed by:		Discrepancy in obtained results, % of number of observations
		trap line method	total catch	
Northern Aral shore	54	30	32	+3.7
Priaralskiye Karakumy	70	44	46	+2.9
Northeastern Kyzylkum	31	18	17	-3.2
Trans-Aral	20	13	14	+5.0
Total	175	104	109	+2.9

Comparative analysis of the abundance of small mammals by the described method in epizootic and nonepizootic areas was performed on the basis of materials obtained from the Northern Ustyurt Plateau, the perimeter of the Ustyurt Plateau, the Aral north shore, the Priaralskiye Karakumy Desert, the Northeastern Kyzylkum Desert and the Trans-Aral in 1951-1980. Data from the first three contiguous regions were combined and examined jointly in view of the relatively small volume of this information. Only those periods of field work by any one epidemic control detachment during which plague epizootics were recorded were used in the calculations. The observations made in the course of such periods were paired by separately summing the animal catches at epizootic and nonepizootic points; only those points for which plague microbe cultures were isolated were treated as epizootic points. Then we calculated the mean number of caught specimens of each species of infection carrier; this average was then used as the relative indicator of abundance.

Table 2 provides an idea of the volume of the material. It includes those animal species which systematically participate in the epizootic process in Aral foci [19], and the infection rate of which is close to the infection rate of the main carrier [5]. The mustelids include three species: The light fisher, which dominates the catch in the north of the enzootic territory, and the weasel and mottled polecat, which are close in abundance to the former only in the Kyzylkum and Trans-Aral.

Analysis of the materials in Table 2 revealed two important points. First of all plague epizootics developed wherever there was a higher abundance of the main carrier of infection--the greater gerbil. Differences in the size of the catch of this species in epizootic and nonepizootic points are so obvious that this conclusion could hardly elicit any doubts. Second, a similar trend can also be discerned in relation to secondary carriers, which have the most important epizootological significance at the Sea of Aral. It manifests itself

Table 2. Catch of Different Mammal Species During Times of Plague Epizootics From 1951 to 1980 in Epizootic and Nonepizootic Areas at the Sea of Aral.

(1) Очаговая территория	(2) Обследовано пунктов	(3) Добыто в пересчете на 100 пунктов обследования							
		зольных пес- чанок (4)	расхохвостых песчанок (5)	полуденных песчанок (6)	гребеннико- вых песчанок (7)	малых туш- канчиков (8)	сумураников (9)	линьков (10)	всего (11)
(12) Северное Приаралье	306	4919	20	136	28	22	47	36	289
	2696	3890	13	109	41	54	34	27	278
(13) Приаральские Каракумы	544	5460	37	174	45	50	22	21	349
	3274	4580	33	128	41	32	23	22	279
(14) Северо-Восточные Кызыл- кумы	132	6031	10	906	5	5	—	17	943
	764	4554	17	544	10	14	—	14	599
(15) Зааралье	135	8285	90	157	23	58	—	16	344
	1007	3863	78	132	19	31	—	8	268
(11) Итого	1117	5721	35	248	33	38	24	24	402
	7741	4244	30	163	33	38	22	21	307

Note: Above the line--epizootic areas, below the line--non-epizootic areas.

Key:

- | | |
|-----------------------------------|---------------------------|
| 1. Focal territory | 9. Yemuranchik |
| 2. Points surveyed | 10. Mustelids |
| 3. Catch, per 100 surveyed points | 11. Total |
| 4. Greater gerbils | 12. Northern Aral shore |
| 5. Red-tailed gerbils | 13. Priaralskiye Karakumy |
| 6. Southern gerbils | 14. Northeastern Kyzylkum |
| 7. Tamarisk gerbils | 15. Trans-Aral |
| 8. Lesser jerboas | |

especially clearly in relation to the southern gerbil and in relation to the total abundance of all secondary carriers. It is also sufficiently noticeable among mustelids and the red-tailed gerbil. An exception is the Kyzylkum, where the proportion of the last species within the communities is very small. As far as the tamarisk gerbil, the lesser jerboa and the yemuranchik [transliteration] are concerned, this trend is expressed in relation to them only in half of the cases, which does not permit an unambiguous interpretation of the obtained data.

In their present form, the materials under discussion here do not yield to mathematical treatment having the purpose of clarifying the significance of the discovered differences. Because of the very great variability of the catch even in a series of observations covering 30 years, the accuracy with which the arithmetic means are determined is far from the level accepted in statistics (this is equally true when other indicators of abundance are used). Therefore paired series of abundance indicators for epizootic and nonepizootic areas were determined for each animal species. The comparison was made in these areas for every pair of observations separately, with a consideration for the nature of the revealed differences. The comparison of abundance was naturally made only in relation to those species which were recorded at epizootic points.

Before going on to a discussion of the results, we need to dwell on a few points which we believe have fundamental significance to interpreting the obtained results. First, different habitats cannot be identically optimal for all animals. Therefore cases are possible where epizooties proceed in habitats that are least suited to the given infection carrier, which automatically causes registration of larger numbers of this carrier in nonepizootic territory (the opposite does not hold, because development of an epizootic process in the presence of a higher abundance of some species permits the assumption that a cause-and-effect relationship exists between these phenomena). Second, the influence of the developmental phase of the epizootic process may also sometimes lead to the same effect. It is fully obvious that even if there is a high abundance of acutely stricken animals, for example at the beginning of the epizootic process, then later on the process may decline dramatically owing to die-off of individuals during the epizooty. Third, we must also consider that presence of even a very high abundance of some particular carrier is usually just one of the factors that predetermines the development of the epizootic process. As an example at maximum abundance, plague-stricken rodents among them may not be registered owing to the absence of the disease agent in the given territory.

These ideas make understandable the total unsuitability of subjecting such materials to mathematical treatment using methods which foresee the use of the absolute values of the indicators being compared. Therefore to determine the significance of the revealed differences we used the sign test, which accounts not for the magnitude of the indicators or the degree of their differences in each pair of observations, but only their direction [9].

The three factors mentioned above reduce the probability of revealing cases of higher abundance of secondary plague carriers within an epizootic territory. Nonetheless their quantities significantly exceed the number of observations with an inverse abundance ratio. That this phenomenon objectively exists cannot elicit doubt, since it can be observed in all regions around the Sea of Aral and among all mammal species that participate in epizooties especially often (Table 3). Moreover the significance of the discovered differences was confirmed by the sign test (in this table and the following table the results of comparing the series of paired observations that are found to be significant in relation to the first or second--the highest for the sign test--threshold for the significance of differences are indicated correspondingly by one and two asterisks). As is evident from Table 3, the regularity of recurrence of a higher abundance of

secondary carriers observed in epizootic points is so obvious that its statistical significance is essentially a function of the number of observations.

Table 3. Number of Cases of Higher Abundance of Plague Carriers in Epizootic Areas in Comparison with Nonepizootic Areas (Percent of the Number of Observation Pairs Under Comparison; The Latter are Given in Parentheses)

Очаговая территория (1)	Большая песчанка (2)	Красно- хвостая песчанка (3)	Полуден- ная песчанка (4)	Гребенщи- ковая песчанка (5)	Малый тушканчик (6)	Ему- ранчик (7)	Куны (8)
(9) Северное Приаралье	83** (57)	82** (17)	59 (54)	62 (21)	70 (20)	59 (22)	81** (36)
(10) Приаральские Кара- кумы	60* (103)	69* (32)	66* (70)	73** (33)	68** (47)	68 (25)	66** (50)
(11) Северо-Восточные Кызылкумы	68* (37)	75 (12)	55 (31)	80 (10)	25 (4)	—	86** (14)
(12) Зааралье	79** (28)	64 (14)	70 (20)	75 (8)	62 (13)	—	90** (10)
(13) Итого	69** (225)	72** (75)	62** (175)	71** (72)	66** (84)	64* (47)	76** (110)

Key:

- | | |
|----------------------|----------------------------|
| 1. Focal territory | 8. Mustelids |
| 2. Greater gerbil | 9. Northern Aral shore |
| 3. Red-tailed gerbil | 10. Priaral'skiye Karakumy |
| 4. Southern gerbil | 11. Northeastern Kyzylkum |
| 5. Tamarisk gerbil | 12. Trans-Aral |
| 6. Lesser Jerboa | 13. Total |
| 7. Yemuranchik | |

Cases where the abundance of some more-sporadically encountered and, as a rule, not very abundant rodents was higher in epizootic areas occurred significantly more rarely: on the north shore of the Aral--the grey hamster, the field mouse and house mouse; Priaral'skiye Karakumy--the same species, plus the yellow suslik; Kyzylkum--the species above, less the field mouse, plus the leptodactylous suslik and furry-legged jerboa; Trans-Aral--grey hamster, house mouse, yellow suslik and furry-legged jerboa. A high abundance of the grey hamster (34 cases) was recorded in epizootic areas most often, especially on the northern Aral shore and in the Priaral'skiye Karakumy.

These data and the data in Table 3 characterize the epizootological significance of the abundance of individual animal species rather graphically. Table 4 contains information used in estimating the total influence of several species of secondary infection carriers on the development of an epizooty. Moreover the relatively rare cases in which epizooties were recorded without concurrent registration of a higher abundance of secondary carriers may be artifacts to a certain degree. This impression is based on the fact that, first of all, the abundance of acutely stricken animals (secondary carriers) does not always persist at a high level in the concluding stages of an epizooty, and second, the mammal catch is constantly oriented toward the main carrier--the greater gerbil. In

this case it would have to be recognized irrespective of the validity of the latter assumption that a higher abundance of secondary carriers is an exceptionally important, and perhaps even mandatory, condition for the appearance and development of epizooties in Aral plague foci.

Table 4. General Frequency of Cases of Epizooties Occurring in Aral Plague Foci in the Presence of a Greater Abundance of Secondary Infection Carriers in Epizootic Areas, in Comparison with Nonepizootic Areas

Очаговая территория (1)	(2) Кол-во сравнивае- мых пар наблюдений	(3) В том числе с большей численностью на эпизootических участках, %				
		(4) одного вида	(5) двух видов	(6) трех видов	(7) четырёх шести видов	(8) всего
(9) Северное Приаралье	70	27,1	17,1	37,1	4,3	85,6**
(10) Приаральские Каракумы	103	21,4	31,1	10,6	22,3	85,4**
(11) Северо-Восточные Кызылкумы	39	38,5	25,6	15,4	5,1	85,6**
(12) Зааралье	30	33,3	26,7	16,7	13,3	90,0**
(8) Итого . . .	242	27,3	25,6	19,8	13,2	85,9**

Key:

- | | |
|---|---------------------------|
| 1. Focal territory | 7. Of four to six species |
| 2. Number of paired observations compared | 8. Total |
| 3. Including with a greater abundance in epizootic areas, % | 9. Northern Aral shore |
| 4. Of one species | 10. Priaralskiye Karakumy |
| 5. Of two species | 11. Northeastern Kyzylkum |
| 6. Of three species | 12. Trans-Aral |

It would not be difficult to persuade ourselves as to the validity of this premise in nature, were so-called pure (separate) colonies of different disease carriers to exist. In reality, however, a complex of species which may and may not catch plague always inhabits the same territory.* But sometimes we can still find regions in which the abundance of secondary infection carriers is usually not very high on the background of sufficient abundance of the greater gerbil. Such is the case, for example, in the flats of the northern Ustyurt.

The dominant type of landscape in this region is vast desert plains. They occupy over half of the territory, ringing the northern Ustyurt foredeep in a semicircle. To the northeast and east, the plains of northern Ustyurt terminate

* This fact is clearly understated by proponents of the single host concept for natural plague foci. Considering that secondary carriers are necessarily included in the epizootic process [20,21], as is constantly confirmed by practical experience, in the best case this concept is a simplification of a complex natural phenomenon.

4. Western edge of the Ayakkum Desert
5. Valley between desert and scarp
6. Karakulka Ravine
7. The plains of Ustyurt adjacent to the ravine

Table 6. Catches of Red-Tailed Gerbils and Light Fitches in Greater Gerbil Burrows in Northern Ustyurt 1971-1979

(1) Вид	(2) Год								
	1971	1972	1973	1974	1975	1976	1977	1978	1979
(3) Краснохвостая песчанка	2	15	46	33	15	6	33	33	152
	3,1	13,9	27,5	18,1	9,2	5,2	14,6	14,4	80,1
(4) Светлый хорек	1	6	6	0	1	2	3	10	19
	1,5	5,6	3,6	0	0,6	1,7	1,3	4,4	10,0

Note: Upper number--absolute, lower number--corrected per 1,000 greater gerbils caught.

Key.

1. Species
2. Year
3. Red-tailed gerbil
4. Light fitch

One of the most important causes behind development of this epizooty was doubtlessly the dramatic increase in abundance of the red-tailed gerbil and the light fitch (Table 6).^{*} In this case the abundance of both species attained an unusually high level within the very first half of the year--long before the beginning of the epizooty. By the moment of its detection, a significant decrease in abundance was noted in place of the usual increase that lasts into fall: The red-tailed gerbil population dropped from 106.8 to 38.9 and the light fitch population dropped from 14.8 to 2.7 individuals per 1,000 greater gerbils caught. The epizooty probably started back in summer and proceeded especially intensively in its first stage owing to massive participation of red-tailed gerbils and fitches (participation of both species of animals in the epizooty in fall was confirmed bacteriologically). However, the decline in abundance of these animals to normal limits, coupled with some other causes, apparently produced the swift die-down of the epizootic process observed later on. Plague microbe could no longer be isolated in spring 1980, despite a meticulous survey. Only greater gerbils with specific antibodies were

^{*} In this region these mammals are so closely associated with greater gerbil burrows that the overwhelming majority of individuals of both species are caught incidentally when the latter are caught. Therefore we felt it possible to describe their abundance relative to the catch of greater gerbils.

discovered; they were found in ever-decreasing numbers in the course of 2 years.

Thus analysis of the epizootic events of the last decades in one of the natural areas containing a small population of secondary carriers in general confirms the conclusion that they are extremely important in epizootological respects. It may be suggested that when animals of this group are low in number, not only do epizootic aggravations of any seriousness whatsoever not occur, but also it becomes essentially impossible for the infection agent to establish itself within the given territory (including when the main carrier--the greater gerbil--is highly abundant). In other words, the so-called secondary carriers are probably a mandatory prerequisite for stable and lengthy persistence of plague microbe in natural ecosystems.

The literature contains reports of a more particular nature (descriptions of individual epizooties) citing similar facts from other areas of the Central Asian focus, for example in Turkmenistan [6,18,24 and others], Mangyshlak [16], northwestern Ustyurt [29], the central and southern Kyzylkum [11,23], the Muyunkumi [7,28] and the southern shore of Lake Balkhash [A. S. Burdelov et al.]. This has encouraged researchers to return frequently to the question as to the true role of secondary carriers in the natural focal occurrence of plague, and to constantly emphasize the fact that their epizootological significance is understated in theory and in practice [8,12-14,25,26, and others]. Nonetheless most authors have not gone beyond recognizing the multiple host nature of microfoci [8,17] or of certain focal areas [1,14]. Only Khrustselevskiy [27] clearly stated the opinion that all of the Central Asian plague focus has a multiple host nature.

In our opinion this brief survey of the literature is sufficient to conclude that the basic conclusions of this work could be extended to the entire Central Asian plague focus. Therefore we are prone to assess the materials presented above, especially when taken together with previously published data indicating systematic and massive participation of secondary carriers in the epizootic process [5,19], as serious evidence in favor of the multiple host nature of this focus. The persuasiveness of these data is not diminished by the fact that they are based on information obtained predominantly in periods of epizootic activity of the focus, inasmuch as it is precisely the epizootic phase that determines the existence, the boundaries and all of the basic characteristics of any natural plague focus. Absence of secondary carriers or their constantly low abundance may lead, as we have shown, to spontaneous disappearance of the infection agent from the territory. Thus presence of secondary plague carriers and their relatively high abundance should apparently be treated as mandatory components of a stable focus of this infection, irrespective of their participation in preserving the microbe in the interepizootic periods. The influence of secondary carriers on persistence of plague agent also deserves the closest possible attention. Evidence that this influence occurs can be found in the sufficiently numerous observations of isolated infected individuals of different species of mammals or even of local epizootics among them coupled with the complete or almost complete absence of plague microbe in populations of the principal carrier [10, 15, and others].

The authors of this article have no intention to diminish the significance of the greater gerbil in the present stage of the development of the Central Asian plague focus. Nonetheless, if we recognize that its ecological structure is more complex than had been commonly thought, we would need to rethink a number of previously formulated theoretical premises and results of some prior research, and we would need to make certain changes in our procedures for epizootological survey of enzootic territories.

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ECOLOGICAL STRUCTURE AND LANDSCAPE FEATURES OF PLAGUE FOCI IN WEST AND SOUTH-WEST ASIA OUTSIDE THE USSR

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[Article by S. N. Varshavskiy and V. P. Kozakevich]

[Text] Natural plague foci of foreign Asian countries are often located near our state border or across it (for example in Tien Shan, Pamir-Alay, Altai, the Transcaucasus and the Transbaykal). Therefore clarification of the ecological and landscape features of Asian plague foci outside the USSR is an important task. This paper examines natural foci located in moderate and subtropical latitudes of West and Southwest Asia.

The ecological structure and landscape features of individual territories are the main indicators for the possible existence of plague enzooties in a given land area. However, either exhaustive geobotanical descriptions of territories that can be classified as enzootic territories are absent from the available literature, or they are scattered among different sources and require a special effort to find and generalize them. Our research had a general biological orientation, and therefore we did not make it our goal to provide detailed information on the manifestations of plague in certain portions of the Asian continent under analysis.

The natural plague foci in the regions that will be examined below are among the oldest and most persistent. They are maintained primarily by gerbils, and they are characterized by distinctly cyclic epizootic activity over a long period of time.

Most foci of West and Southwest Asia have not been studied sufficiently, while some have been studied quite poorly. Nonetheless, if we base ourselves on available information, we can differentiate the following natural foci in this region today, and briefly characterize their ecological structure and the particular landscapes on which they occur.

The Kurdo-Iranian mountain-steppe focus: Occupies the western portion of the Iranian uplands (areas south of Lake Urmia, the mountains of Iranian Azerbaijan and Kurdistan, and the western Zagros Mountains), the southeastern-most region of Turkey and the northeastern regions of Iraq (the region of Suleimania).

In places, the northern border of the plague enzootic comes close to the Araks focus in our Transcaucasus. Some researchers combine these two foci into a single whole (Baltazard et al. [17,18] refer to it as the Kurdo-Caspian focus). But this point of view is not commonly accepted. The enzootic territory of the Transcaucasus is separated from the foreign Iranian focus by a significant physical obstacle--the vast Plain of Ararat, the majority of which (the Araks Valley) is now occupied by an agricultural landscape. The independence of the plague enzootic in this area of the Transcaucasus is also validated by other data (for example the peculiarities in the way the epizootic process manifests itself) [13]. Obviously, therefore, this can be referred to as a single focus only in the historical aspect.

The principal landscapes of this focus are mountains and mountain valleys, plateaus and basins located at 1-2 km absolute altitude. The plant communities of these landscapes consist of different species of soil-building plants found in mixed grass and herbaceous steppes (feathergrass, sheep's fescue, koeleria, meadow grass, brome, milk vetch etc.), with the participation of wormwood (*Artemisia fragrans*, *A. austriaca*) and upland xerophytes. These are predominantly areas of grazing and nomadic animal husbandry.

Presence of numerous hosts within the focus--the most important feature of this ecological structure--is well pronounced. In the opinion of some researchers [15-19,22] the existence of the focus is maintained by a complex of resistant (Persian and red-tailed gerbils) and sensitive species (Minor Asian and Vinogradov's gerbils). The focus is typified by the complete absence of rats. Gerbil fleas serve as vectors--*Neopsyllus* sp., *Stenoponia insperata*, *Xenopsylla buxtoni*.

The Anatolian-Armenian mountain-steppe focus: Embraces the Anatolian Plateau in the northeastern and central portions of Turkey, characterized predominantly by steppe and mountain-steppe landscapes of the same type as in the neighboring portion of the Kurdo-Iranian focus (around Lake Urmia). Very little research has been conducted on the focus. The existing data permit the suggestion that at least two mesofoci are present--in Eastern Anatolia (the Kizil-Irmak River Basin) and on the Kars Plateau (the Erzurum-Kars region), where the territory containing natural lake foci is directly contiguous with the focus of this infection in the Armenian SSR (the Leninakan Plateau). Plague has been known since ancient times in the latter mesofocus [3,12]. Outbreaks often recurred in the same places (for example in Erzurum, Trabzon, Kars, Bayazet, Akhaltsikhe, Yerevan). The red-tailed gerbil and, obviously, the Minor Asian suslik are the plague carriers. As we know, the latter species is widespread in Minor Asia [24,25].

The Turkish-Syrian semidesert-desert plain focus: Occupies the southern part of Turkey (the Vilayet of Urfa, where plague outbreaks occurred in 1826 and 1947) and the northern part of Syria. It is separated from the enzootic steppes of Anatolia by the mountain chains of the Armenian Eastern Taurus Mountains. The dominant landscapes are dry uphill steppes (south of the Taurus Mountains) and primarily Iraqi-Syrian rocky ephemeral-wormwood desert (containing *A. herba alba*, *Carex pachystylis* etc.), typical of the left-bank territory of the upper

reaches of the Euphrates within the limits of the northern and northeastern regions of Syria (the Dzhezire [transliteration] region). The obvious plague carriers in this region are gerbils of genus *Meriones* [28]. They are the dominant rodents in both the Turkish and Syrian portions of the focus [26].

It must be assumed that the rest of the neighboring territory of Syria must also be enzootic in relation to plague--particularly the mountain-steppe and desert territories of the right-bank Upper Euphrates and the adjacent Turkish region containing the lower reaches of the Orontes River and the Nur Daglari range (the Hatay Province). Indirect evidence of this may be found in the frequent epidemics that have broken out over a very long period of history in different portions of this region. In particular not less than 15-16 outbreaks of plague were noted between 1348 and 1878 in Haleb (Aleppo), while just between 1773 and 1843 13 outbreaks were registered in the internal regions of the province [23]. Plague also recurred in Antakya (Antioch) (for example in 542, 594, 1097, 1546 and 1758). But we do not as yet possess any positive information that plague agent has survived here in nature.

The Lebanese mountain-steppe focus: Apparently occupies the maritime part of Syria, Palestine and primarily the mountain regions of Lebanon together with the Jebel Liban and Antilebanon ranges. This focus had not been described before [6]. The very ancient and perpetual manifestation of plague in Levant and Phoenicia is known to be centered predominantly in Lebanon as well as Palestine.

One important fact is that plague epidemics were often recorded in the same places in Lebanon and Palestine [1a,5,29-31]: in Tripoli (from 1719 to 1843--not less than six times), Saida (Sidon), Beirut (from 1726 to 1933--nine times), Jerusalem (from 1760 to 1838--not less than four times), Jaffa (from 1797 to 1947--not less than five or six times). These epidemics cannot all be explained, in our opinion, only by importation from without or by epizooties among harbor rats. It should be assumed that some of the outbreaks were doubtlessly the result of manifestation of epizootic plague supported in nature by local "wild" rodents.

The dominant landscapes of this focus are mixed grass and herbaceous steppes with some subshrubs mixed in, and mountain steppes dominated by several species of feathergrass, brome, sage and wormwood. These steppes are developed on the slopes of Jebel Liban and Antilebanon, and in the valleys of the upper reaches of the Orontes, Litani and Jordan rivers between these ranges. Complexes of upland xerophytes, grasslands and herbaceous vegetation are also abundant in the upper mountain belt of Lebanon. Obviously the main carriers of plague are gerbils of genus *Meriones*, the various species of which are rather abundant here [20,32].

The Syrian-Mesopotamian desert focus (plateau-plain type): Embraces Upper and Lower Mesopotamia, including Iranian Khuzestan, apparently all of the Syrian plateau and possibly Kuwait.

Natural occurrence of plague is typical between the Tigris and Euphrates rivers and adjacent territories. Plague epidemics that frequently decimated cities (Baghdad, Kerbela [transliteration], Dagara, Amara [transliteration], Al 'Amarah, Ad Diwaniyah etc.) and rural centers were recorded in the central part of this region (at least since the 8th century A.D. according to available information). While in the cities the infection was imported by shipborne rats, in rural areas, where rats are absent from homes, plague may have persisted only in the bodies of "wild" rodents, being transmitted from the latter to man with the help of the flea *Pulex irritans*, which is unusually abundant in Iraq [19].

We know practically nothing about plague on the Syrian plateau (the Syrian desert). However, we would have to assume that this territory, which is close in landscape and fauna to neighboring regions in which plague occurs naturally, should also most likely be enzootic with respect to this infection, according to Fenjuk's rule [11].

The landscapes that dominate beyond the limits of the ancient agricultural zone of irrigated agriculture and floodplain tugai vegetation in the inter-fluvial area and on the wadi-cut grazing lands of the Syrian desert are characterized by ephemeral and ephemeroid-wormwood plant communities (*A. herba alba*, *C. pachystylis*, with the participation of herbaceous grasses--*Stipa*, *Poa*) and halophytic plant communities of the Iraqi-Syrian and, in the south, Sahara-Saudi types.

The Indian and red-tailed gerbils are the plague carriers. The gerbils *M. crassus*, *Gerbillus nanus*, *G. dasyurus* and *G. cheesmani* also have epizootic significance. The fleas *X. buxtoni*, *St. insperata* and *X. astia* are the vectors.

The Iranian-Afghan desert focus: As we know [6], this focus lies in the low mountains of central Iran, which contain vast internal-drainage basins such as Dasht-e-Kavir and Dasht-e-Lut, and it also obviously occupies the mountains of northern Iran, for example Turkmen-Horasan and Kopet-Dag, the uplands neighboring on the latter, mountain regions (the western edge of the Paropamisus Mountains) and depressions (Dasht-i-Namid, Namakzar) of western Afghanistan. It may be possible that the northwestern part of Kopet-Dag in the Turkmen SSR is at least historically a derivative of the Iranian-Afghan focus. The landscapes of this focus include semideserts and deserts of the Turanian and West Asian types containing sparse ephemeral-ephemeroid vegetation (annual halophytes in saline depressions and on salt deserts, and subshrubs such as, for example, wormwood, ephedra and kurchavnik [transliteration]) typical of foothill hammada and upland xerophytes in higher belts. This focus should be broken down further into mesofoci, and perhaps into categories of higher rank.

This focus has been studied extremely little thus far.

The probable carriers in this area are the red-tailed and greater gerbils. These limits of the focus apparently correlate to some extent with the range of the greater gerbil, as far as we know today [1,2,4,7,9,27], in Iran and the adjacent portion of Afghanistan. The Indian gerbil is possibly the carrier in the east and south of the focus.

We know almost nothing about the natural occurrence of plague in the other half--central and eastern--of Afghanistan. We can surmise the existence of foci of this infection only on the basis of epidemics that have often appeared here in specific geographical and landscape areas, and on the basis of the similarity of the natural conditions and the rodent communities.

Considering this information, we can tentatively discuss the following natural plague foci in the eastern part of West Asia.

The southern Afghan plain focus: Occupies the sandy desert of Registan, the sands of the lower reaches of the Helmand River (Garmsir [transliteration], Chakhansur) and the hilly closed drainages of the clayey-rocky desert of Dasht-i-Margo, together with its typical ephemeral water channels and large, frequently salty lakes (the Gaud-i-Zureh salt desert)--relics of water basins of the Tertiary and Quaternary periods. The enzooty is obviously also inherent to the plains of eastern Iran and the vast Hamun salt desert (the historical region of Sistan). Here the boundary of the focus is apparently determined by the Palangan range and the Serhad plateau, which separate the desert of Dasht-i-Margo from the Iranian desert of Dasht-e-Lut, which is enzootic with respect to plague.

The dominant landscapes contain sparse vegetation typical of clayey-rocky subtropical mountain basins, represented by wormwood, halophytes, milk vetch, ephedra, kuziniya [transliteration] and others, as well as salt desert communities and halophytic meadow grasses in salt desert depressions. Associations of saxaul and other shrubs dominate the sandy areas. The territory is used for animal grazing, and it is very sparsely populated.

It is highly probable that landscape peculiarities and epizootic activity within the focus may be used to distinguish not less than two relatively independent mesofoci (Sistan and Kandahar-Registan). Obviously the Helmand valley separating them is not an absolute obstacle to migration of the disease agent.

Plague has long been known in the region in the form of epidemics. Its predominant recurrence in the same places and information acquired by us on the relationship of some outbreaks, for example in 1611 in Kandagar, when plague also spread through India (1611-1618), with a population explosion of "mice" [31], permit us to treat these events as activation of a local enzootic, but for practical purpose this focus has not yet been studied. In our opinion the plague carriers within can be tentatively classified in the group of "southern" species of gerbils, and primarily the locally widespread [8,10] lesser gerbils of genus *Gerbillus* (Baluchistan dwarf *G. nanus*, *G. Cheesmani*), the Indian gerbil and some representatives of genus *Meriones* (red-tailed gerbil and *M. crassus*).

The Afghan-Pakistani moderate-altitude desert- steppe focus. Located in east-central Afghanistan, and probably extends into the western mountain regions of Pakistan. In Afghanistan it occupies the dry, slightly rugged Gazni-Kandagarskoye Plateau, which is cut by wide river valleys. It is apparently limited on the west by the Helmand River and the central Afghan mountains

(Koh-i-Hisar, Zang [transliteration], Koh-Bandi-i-Baian, Koh-Baba and others) and on the south by the channels of the foothill rivers Arghangab and Dori, which separate the plateau from the sandy flats of Registan. Obviously the eastern boundary of the focus should be sought at the edge of the Iranian upland, the east side of which is formed by the Suleiman Mountains and the Spingar [transliteration] Range (Safed Koh), which drops steeply to a bend in the alluvial plain of the Indus River.

The landscapes are dominated by formations of upland xerophytes (milk vetch, *Andropogon* sp., kuziniya, *Acantholimon* sp., *Onobrychis* sp., etc.), with the participation of thorny shrubs, thin xerophytic acacia forests and dry subtropical mountain steppes. The land is dominated by animal grazing.

Plague appeared on several occasions in the form of outbreaks in a number of localities, particularly in the vicinities of Ghazni, Kabul, Jamrud and Jalalabad, and in the mountain valley of the Tochi River. Analysis of epidemic events in relation to landscape and ecology permits the conclusion that they were more likely the result of manifestations of local enzootics and not of importation from without. The focus has not been researched at all. The red-tailed, Persian and Indian gerbils, which are widespread over the dry moderate-altitude landscapes, may be the carriers within the focus.

The Hindu Kush high-altitude focus is obviously located in the subalpine and alpine belts of the northern slopes of the western and central Hindu Kush, at an absolute altitude of about of 3,000 meters and higher. This focus (as is true with other natural plague foci in Afghanistan) is hypothetical. There is no information on epizootics within this focus. Nonetheless, relying on meager historical data, in our opinion Sticker [31] validly believes the Hindu Kush region to be on par with the Himalayas, Tien Shen, the Kunlun mountain system, Mongolia and some other regions, as being one of the centers of constant presence of plague (a pest nest), from which infection has spread on several occasions to Kashmir, Punjab and India (for example in 1574 and 1597).

The high-altitude landscapes of the region are represented by mixed grass-herbaceous meadows very close in character to steppes, dominated by western Himalayan and Pamir-Alay types and upland-xerophilic vegetation. The most likely carrier is the red marmot badger, which is rather widespread in this westernmost part of its range.

Absolutely nothing is known about plague on the north edge of Afghanistan--the vast loess Baktriy [transliteration] Plain. It is populated sporadically, predominantly in oases (on the slopes of irrigation ditches, in ruins and so on) and sand deserts, by the greater gerbil [1,4]. The sole indication of a possible plague enzootic here, besides the occurrence of the greater gerbil, is an outbreak, mentioned by Akiyev [1], of disease highly suspected to be plague in Haibak (Samangan) in 1936 (the Kholm River valley, 95-100 km southeast of Mazar-e-Sharif). Significantly, plague has not yet been revealed on Soviet territory, in the neighboring regions of Badkhis, Karabil and Obruchevskaya Steppe.

All of the natural plague foci examined above are located within the temperate zone of West Asia. In contrast to them, plague enzootics in the southwestern part of the continent are associated with subtropical regions of Arabia. We can distinguish here the desert upland-plain Saudi-Yemen focus, located in the southwestern portion of the Arabian Peninsula and in the border regions of Saudi Arabia and Yemen (the vicinities of El-Asir and Khavlan [transliterations]). Plague has manifested itself in this region from ancient times to recent years [29,30]. In the 19th century plague recurred not less than 10 times on the El-Asir Plateau, some of the outbreaks being long in duration, for example in 1844-1845, 1853-1854 and 1874-1879 [30]. The most recent plague outbreaks of the current century occurred in 1951 (Yemen, Khavlan Province), 1952 (Saudi Arabia, El-Asir Plateau), 1969 (the border between Saudi Arabia and Yemen) [14,29].

Despite this, almost no research has been conducted on the epizootology of plague in this focus. Most information on the natural occurrence of plague foci in this area is hypothetical, and there are no facts available on the ecological structure of the focus.

The landscapes of the focus in the Jabal-al-Hijaz and Sirat [transliteration] mountain ranges (to an altitude of 2,000-3,000 meters) consist of desert savannahs and shrub-woody xerophilic communities of the Yemen-Somali type, while at elevations below 1,000 meters they are represented by formations typical of local versions of tropical sandy deserts and rocky deserts. The channels of numerous wadis populated with large numbers of rodents [21] represent unique plague microfoci. Gerbils of genus *Meriones* (*M. rex*, the Libyan gerbil) are the hypothetical carriers; also probable are *Gerbillus gerbillus* and some other rodent species, which, according to Bahmanyar [14], inhabit enzootic regions.

Such are our ideas on the landscapes, vegetation groupings and animal world (vertebrate and invertebrate) of some territories of Asia outside the Soviet Union enzootic with respect to plague. Attempts at describing the laws governing manifestation of natural plague foci in foreign countries (including Asian) are often encumbered by the absence of necessary information on carriers and infection transport because epidemiological (epizootological) surveys of enzootic territories of any regularity whatsoever are not conducted. In the future, when regular surveys of natural foci will be organized, information on them will become more substantial, particularly in West and Southwest Asia, and the territorial limits of the foci will be substantiated. However, even the knowledge we have today of the general laws governing the locations of plague foci in this region of Asia should be thought of as sufficiently persuasive.

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BACTERIOGINOGENICITY OF BRUCELLA ISOLATED IN CAUCASUS AND THEIR TAXONOMIC EVALUATION

Moscow ANTIBIOTIKI in Russian Vol 29, No 1, Jan 84 (manuscript received 20 May 83) pp 29-32

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[Abstract] The ability of pathogens of highly virulent infections to synthesize bacteriocins is of scientific interest. However, few studies were aimed at bacteriocinogenicity of the brucellosis pathogen. The goal of this study was to determine the utilization of *Brucella* bacteriocinogenicity as a taxonomic index, to determine the phylogenetic relationship of *brucella* with other microorganisms and to investigate the physical-chemical properties of brucellocine. Out of 216 cultures isolated in the Caucasus, 62.1% produced brucellocin. The bacteriocin could be isolated in all strains of *B. Melitensis*, *B. abortus* and *B. suis* tested; also most of the *B. ovis* strains showed its presence. The physical-chemical properties of brucellocin indicated that the active principle exhibited characteristics of a protein; certain similarities were observed with other *brucella* species. Analysis of the characteristics of bacteriocinogenicity of *brucella* expanded the range of taxonomic indices which could be used in identifying and differentiating *Brucella*. References 12: 5 Russian, 7 Western.

[576-7813]

FOOD TECHNOLOGY

MENU FOR CHILDREN

Moscow KOMMERCHESKIY VESTNIK in Russian No 5, Mar 84 pp 18-19

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[Abstract] Recent developments in the area of substitutes for mother's milk produced several dry mixtures (Malyutka, Malysh, Vitalakt) which nevertheless were not adequate to satisfy the demand. New orientation was directed towards production of liquid and paste milk products. The report highlighted the advantages of liquid milk products which could be stored for many days. In addition to the milk products designed for babies, a series of yogurt-like milk flavored with fruit fillers are in production for the preschool and school-age children. Having solved the problem of milk products supply, attention must be shifted to preservation of fruits and vegetables. A sharp increase in production of products for children will result from the newly constructed plant A9-KLM. According to the advice of dietologists, purees and juices do not satisfy the needs of growing bodies; it is necessary to provide them with coarsely ground or diced fruits and vegetables. It is also advisable to provide mixtures of several items. At present, the selection is limited. It could be increased by addition of liver and meat. Production of such assortments created a problem for machinery designers, for no such equipment was available. So far no solution has been found to preparing this multicomponent variety of canned fruits, vegetables and meats.
[511-7813]

UDC 575 + 575.42:001.1

ROLE OF GENETICS AND SELECTION IN IMPLEMENTATION OF FOOD PROGRAMS

Moscow ZHURNAL OBSHCHEY BIOLOGII in Russian Vol 45, No 1, Jan-Feb 84
(manuscript received 22 Mar 83) pp 28-35

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[Abstract] This is a lecture delivered 21 Sep 82 at a general session of the Division of General Biology, USSR Academy of Sciences. Production of food in recent years has become an industrial process. A large agricultural

complex was formed in the USSR combining aspects of food, chemical, metallurgical, transportation and machinery building industries. To obtain larger yields, a number of processes are being introduced: soil treatment, fertilization, pest control and development of new genetically-modified hybrids. Many new hybrids were developed during the last five year plan. The area devoted to cultivation of various cereals was increased. In parallel, new lines of cattle were bred as well as of pigs, lambs and chicken. Individual achievements of various institutes and academies are recited, concentrating on genetic modifications. But there are still some problems; closer cooperation is needed between academic institutions and selection centers; genetic selection should concentrate on the most productive lines of animals and plants; modern molecular biology methods must be used along with mathematical modelling in identification of valuable genotypes; it is necessary to develop a solid scientific base for genetic engineering and its application in practical breeding.

[554-7813]

GENETICS

MOBILE GENES

Moscow PRIRODA in Russian No 2, Feb 84 pp 72-78

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[Abstract] A popularized review is presented of the problem of transposable elements in eukaryotic cells, particularly as they pertain to *Drosophila* genetics. Current knowledge on mutator activity and their implication in hybrid dysgenesis is reviewed, as well the polar effects of their insertion into chromosome sites. The article ends with a discussion of the possible viral origins of the transposable elements in view of certain similarities to the DNA of some retroviruses. Figures 5; references 10: 1 Russian, 9 Western.

[527-12172]

UDC 575.113:595.773.4

INSTABILITY OF RECOMBINANT MOLECULES

Moscow GENETIKA in Russian Vol 19, No 10, Oct 83 (manuscript received 1 Mar 83) pp 1573-1581

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[Abstract] Analysis and organization of data on rcDNA was attempted based on the example of hybrid plasmids of *E. coli* K-12. The stability of rcDNA was defined as its preservation in an unchanged state by all population cells. Two principal types of instability were reviewed: replication and structural instability. Replication instability was manifested by elimination of rcDNA from the cells of the population studied and structural instability--by actual change in the chemical structure of rcDNA. Replication instability of rcDNA consists of two basic factors: 1) possible loss of plasmids by the cell and 2) selective predominance of plasmid-less cells in comparison to plasmid-containing cells. The reason for the loss of plasmid by the cells may be due to disturbance of replication mechanism or of the distribution of plasmid molecules between divided cells. Structural

instability includes topologic instability (change in the structure of a plasmid) and regulatory instability. Finally, there exists metabolic instability caused by overproduction of proteins or metabolites coding for rcDNA. References 30: 3 Russian, 27 Western.
[538-7813]

UDC 575.13:576.312.32:576.851.48

INTEGRATION OF RPI PLASMID WITH CHROMOSOME OF *recA*-BACTERIA *ESCHERICHIA COLI* K-12. TWO CLASSES OF Hfr STRAINS

Moscow GENETIKA in Russian Vol 19, No 10, Oct 83 (manuscript received 5 Apr 82, after final revision 24 Oct 82) pp 1582-1592

DANILEVICH, V. N., VOLOZHANTSEV, N. V., STEPANSHIN, Yu. G. and AMOSENKO, F. A., All-Union Scientific Research Institute of Applied Microbiology, Moscow Oblast

[Abstract] Experimental results were reported of the study of mechanisms of action of plasmid RPI with the chromosome of *E. coli* K-12 cells defective in respect to recombination. Using temperature-sensitive mutants RPI differing by the frequency of transposition of the *TnI* element, it was shown that insertion of RPI into the chromosome of *recA*⁻-bacteria leads to the formation of two classes of Hfr strains (stable and unstable), one of which could be the source of R'-plasmids (the stable Hfr-strain). A new method for R' plasmid selection was proposed based on the findings that significant part of the R' transconjugants arising at low frequency in crosses between stable Hfr's and *E. coli* *rec* recipients contain plasmid-chromosome hybrids (R'=plasmids). The data obtained led to the assumption that stable integration of RPI with chromosome *recA*⁻-bacteria occurs by a mechanism involving IS-elements of bacterial chromosome, i.e., linked with insertion of chromosome IS elements into the plasmid. Figures 3; references 15: 3 Russian, 12 Western (1 by Russian authors).
[538-7813]

UDC 575.153:576.85.45

Tn 10 AND Tn 5 TRANSPOSON TRANSLOCATION INTO CHROMOSOME *YERSINIA PESTIS*

Moscow GENETIKA in Russian Vol 19, No 10, Oct 83 (manuscript received 27 Jul 82, after final revision 7 Jan 83) pp 1593-1603

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[Abstract] The goal of the present work was to: 1) study the ability of transposons Tn 10 and Tn 5 to insert into the *Y. pestis* chromosome, 2) to identify auxotrophs induced by insertion of these transposons followed by

reorganization in neighboring fragments of chromosomal DNA and 3) to evaluate the ability to use the data obtained for preliminary genetic plotting of the *Y. pestis* chromosome. It was shown that the transposons Tn 10 and Tn 5 could be inserted into the chromosome *Y. pestis* inducing singular and multiple mutations in *ilv*, *ser*, *arg*, *pur*, *pro*, *leu*, *nic*, *tyr* and *gua* genes. Frequent overlap of mutant markers in different auxotrophs indicated close proximity of respective genes on the chromosome. Rearrangements induced by transposons near the insertion site and duplication of transposons followed by incorporation of copies into novel sites resulted in additional defective genes making it possible to select various polyauxotrophs. A fragment was identified in the chromosome *Y. pestis* containing following genes: *lys...tyr-ser-arg-ilv-leu-gua-ade(pur)-pro...his...pyr...trp*. Thus, these transposons could be used in preliminary plotting of the chromosome *Y. pestis*. References 21: 10 Russian (1 by Western author), 11 Western. [538-7813]

UDC 575.234.46:579.252.5

MULTIPLICITY OF SITES FOR INTEGRATION OF Mu-LIKE BACTERIA PHAGES INTO CHROMOSOME AND PLASMIDS OF *PSEUDOMONAS AERUGINOSA*

Moscow GENETIKA in Russian Vol 19, No 10, Oct 83 (manuscript received 23 Jul 82, after inal revision 26 Jan 83) pp 1604-1610

PLOTNIKOVA, T. G., AKHVERDYAN, V. Z., REULETS, M. A., GORBUNOVA, S. A. and KRYLOV, V. N., All-Union Scientific Research Institute of Genetics and Selection of Industrial Microorganisms, Moscow

[Abstract2 In an earlier study it was shown that one of the Mu-like phages (D3112) was integrated into the plasmid RP4 resulting in mutations in various plasmid genes. In the present study it is shown that Mu-like phages *P. seruginosa* (B3, B39, PM69) have the capability to integrate into plasmids RPLII, RMS 148 and RMS 163; occasionally this resulted in mutations forming in the genes of these plasmids. Thermoinduction of lysogenic bacteria also leads to identification of clones with increased quantity of given mutation types. Chromosome localization of prophage D3112 was identified showing its ability towards integration during lysogenization into various fractions of *P. seruginosa* PAO I chromosomes. Certain auxotrophic and morphologic mutants (*thi*, *met*, pigmented, *met-pigmented*) were found at about a 10% frequency among survivors of long incubation of PAO (D3112 cts 15) or PAO (B39 cts 1) lysogens at 42°C, the spectrum of these mutants being dependent on the time of incubation. Figures 3; references 20: 5 Russian (2 by Western authors), 13 Western. [538-7813]

TRANSPOSITION OF D3112 PHAGE GENOM IN ESCHERICHIA COLI CELLS

Moscow GENETIKA in Russian Vol 19, No 10, Oct 83 (manuscript received 23 Jul 82, after final revision 26 Jan 83) pp 1611-1615

PLOTNIKOVA, T. G., YANENKO, A. S., KIRSANOV, N. B. and KRYLOV, V. N., All-Union Scientific Research Institute of Genetics and Selection of Industrial Microorganisms, Moscow

[Abstract] In continuation of the work published concurrently in another report, it is shown that in a heterologous system, D3112 phage genom is capable of transposition into E. coli chromosome as a component of the hybrid plasmid RP4 Tc^rKm^S::D3112. The frequency of transfer of some chromosomal markers by this hybrid plasmid was higher than by the RP4 plasmid. Auxotrophic mutants and mutants incapable of utilizing various carbohydrates were found among the E. coli clones which survived long incubation at 30°C. These mutants arose from phage integration into E. coli chromosome because prototrophic transductance derived from them have lost their ability to produce D3112 phage after treatment with generalized transductivity PI phage. After introduction of RP4 into E. coli, clones with mutations in Km or Tc genes of RP 4 plasmid were found carrying insertions of D3112 genomes. References 19: 9 Russian (2 by Western authors), 10 Western. [538-7813]

REGULARITIES OF INHERITANCE OF RESISTANCE CHARACTERISTICS TO YELLOW RUST (PUCCINIA STRIIFORMIS WEST) BY WHEAT HYBRIDS DURING DIFFERENT STAGES OF VEGETATION

Moscow GENETIKA in Russian Vol 19, No 10, Oct 83 (manuscript received 20 Oct 82) pp 1674-1679

ANPILOGOVA, L. K., North-Caucasus Scientific Research Institute of Phytopathology, Krasnodar

[Abstract] Because of contradictory statements on the inheritance of resistance to yellow rust pathogen by wheat hybrids, this problem was investigated under field conditions and in hot houses to determine the regularities of the inheritance of this characteristic in adult plants and in seedlings. The study was done on F₂ hybrids of crosses obtained from varieties resistant to several fungi and a susceptible variety of winter wheat Stepnaya 135. It was established that the inheritance characteristic is passed by a simple scheme controlled by both dominant and recessive genes. Depending on the relationship "host variety--pathogen clone", the following types of resistance control could be obtained: identical type for seedling and panicle stages, or the resistance of adult plants being caused by genes effective during the seedling phase and additionally by genes effective during panicle stage, or by completely different genes effective during panicle stage only. References 15: 7 Russian (1 by Western author), 8 Western. [538-7813]

INHERITANCE OF SPRING WHEAT RESISTANCE TO COMMON ROOT ROT.
COMMUNICATION 1: MONOSOMIC GENETIC ANALYSIS OF SKALA VARIETY

Moscow GENETIKA in Russian Vol 19, No 10, Oct 83 (manuscript received 13 Sep 82) pp 1668-1673

SAVEL'YEVA, N. M. and MAYSTRENKO, O. I., Institute of Cytology and Genetics, Siberian Department of the USSR Academy of Sciences, Novosibirsk

[Abstract] Root rot is a widely disseminated disease of grain cultures caused by a number of fungi found in soil, seed capsules and in the very seeds. The optimal method to control root rot is to derive resistant varieties. The goal of the present study was to evaluate characteristics of the inheritance of Skala spring wheat resistance to root rot and to identify chromosomes with genetic effect on this characteristic. The Skala variety was used in these studies because it is resistant to root rot, it is adapted to northern climate and it is widely planted in northern territory. Monosomic genetic analysis was performed Skala and 21 lines of a susceptible variety Diamant 2 (F_2 population) under field conditions. It was shown that the relative resistance of spring wheat is a recessive trait controlled by genes located on three chromosomes: 2B, 2D and 6A. References 21: 9 Russian (1 by Western author), 12 Western. [538-7813]

UDC 633.112.1:575.1:664.61.7

GENETIC ANALYSIS OF GRAIN QUALITY CHARACTERISTICS IN HARD SPRING WHEAT
(TRITICUM DURUM)

Moscow GENETIKA in Russian Vol 19, No 10, Oct 83 (manuscript received 14 Jul 82, after final revision 2 Dec 82) pp 1686-1692

BEBYAKIN, V. M. and MARTYNOV, S. P., Scientific Research Institute of Agriculture of the Southeast. Saratov

[Abstract] Combinational ability of various varieties of spring wheat: Leucurum 1803, Gordeiforme 1827, Lacota and Leeds was investigated searching for new lines with good harvesting properties and trying to determine the effect of genes controlling genetic variability of diagnostic characteristics of grain quality. It was established that L1803 exhibited a valuable additive complex in respect to the mass of 1000 grains; Leeds--in respect to the content of carotenoid complexes. Grain vitreousness and the content of protein, as well as of carotenoid pigments are controlled by a system of genes with addotove effect. Principal input in genetic variability of the structural-mechanical properties is due to non-alleal interactions (epistases). References 12: 11 Russian, 1 Western. [538-7813]

INVESTIGATION OF INTRA- AND INTERPOPULATION DIFFERENTIATION OF HUMAN GENOMES BY MOLECULAR HYBRIDIZATION OF DNA

Moscow GENETIKA in Russian Vol 19, No 10, Oct 83 (manuscript received 16 Sep 82) pp 1733-1741

LEBEDEVA, I. A., MEDNIKOV, B. M. and RYCHKOV, Yu. G., Department of Anthropology Moscow State University imeni M. V. Lomonosov; Interdepartmental Laboratory of Molecular Biology and Bioorganic Chemistry

[Abstract] Genetic study of intrapopulation variability and differentiation of populations may be done in two ways: indirectly by estimating the degree of product heterogeneity coded by specific structural genes and directly by determination of genomic proximity. Molecular DNA-DNA hybridization was used to compare repetitive sequences with low degree of intragenomic divergence in representatives of several ethnic groups: Russian, Buriats and Paleoasiats. Intergenomic differences of the studied populations were determined by a decrease in average melting temperature of hybrid duplexes relative to thermally stable homologous ³H-labelled DNA of Russian representative. Statistically significant differences were observed between the three groups studied, but within each group there were no differences. This molecular-genetic approach to genetic differentiation studies of human populations can serve as an additional method supplementing the traditional method based on studies of various genetic markers. Figures 5; references 13: 3 Russian, 10 Western.
[538-7813]

UDC 575.23 + 575.2.084]:608.1/.4

SHOULD EXTRACHROMOSOMAL GENETIC ELEMENTS BE RECOGNIZED AS INVENTIONS

Moscow ANTIBIOTIKI in Russian Vol 28, No 12, Dec 83 (manuscript received 8 Jun 83) pp 915-923

BARTOSHEVICH, Yu. E., KOROVKIN, V. I. and NAVASHIN, S. M., All-Union Scientific Research Institute of Antibiotics, Moscow

[Abstract] The legal basis for recognizing inventions in case of modifications of natural products is discussed. Evidently, legal uncertainties exist in the USSR patent law as to what is to be considered an "invention" since in the true sense no synthetic genetic material exists as yet, only derivatives of natural organisms. Yet rapid development of genetic engineering requires that this problem be resolved. Extrachromosomal genetic elements are unique in that they combine the concepts of "substance" and "microbial strain". It was stated that indeed there appears to be legal similarities between plasmids and phages which already have been recognized as inventions. Therefore, they should not create any additional legal problems. Nevertheless, because there appears to be no pressing need to legalize plasmids as "inventions", their legal protection should be considered as a prestige item rather than a truly legal concept. References: 12 (Russian).
[577-7813]

PHYSIOLOGICAL ASSESSMENT OF CAPACITY FOR PROCESSING INCREASING AMOUNTS OF VISUAL INFORMATION BY HUMAN OPERATORS

Moscow ZHURNAL VYSSHEY NERVNOY DEYATEL'NOSTI in Russian Vol 33, No 6, Nov-Dec 83 (manuscript received 13 Dec 82) pp 1028-1033

GORBUNOV, V. V., MAKARENKO, N. V. and DOSYCHEV, V. V., Kiev

[Abstract] Determinations were made of the psychophysiological correlates involved in the processing of increasing quantities of visual information within a limited period of time. Standard techniques were employed in assessing 147 subjects, 19-25 years old, subjected to an increasing volume of visual input (30-160 signals/min) while engaged in a ternary selection test [Gorbunov, VV, ZH. VYSSH. NERVN. DEYAT., 28(1): 41, 1978]. On the basis of the probability of error-free performance the subjects fell into 3 groups in relation to the volume of signal input processed and 0.95 probability of error-free performance: Group I--up to 80 signals/min. Group II--up to 90 signals/min, and Group III--up to 110 signals/min. The respective information-processing capacities for these 3 groups were 1.66, 1.95 and 2.29 bits/sec. A further increase in visual signal presentation led to a decrease in information processing. Correlation with a variety of physiological characteristics (heart rate, respiratory rate, EEG parameters, etc.) indicated that the rate of information processing was directly related to individual physiological reserves, and suggested that further improvements could be anticipated by appropriate job training. Figures 3; references 18: 17 Russian, 1 Western.
[530-12172]

PROBLEMS OF CONTROL OF HUMAN OPERATOR CONDITION

Moscow PSIKHOLOGICHESKIY ZHURNAL in Russian Vol 5, No 2, Mar-Apr 84, pp 152-155

DIKAYA, L. G. and MITROFANOV, B. N.

[Abstract2 The conference on the title subject was held in Riga in 1983 in five sections devoted to the following subjects: methods, means and systems of selfregulation of human conditions; psychodiagnosis and control of human operator's conditions in applied studies; methodological and theoretical problems in psychodiagnosis; diagnosis of human operator conditions by speech

activity; and psychodiagnosis and structure of the activity. In all, more than sixty papers were presented by scientists from 70 Soviet scientific research centers. Further methodological and theoretical studies on the questions of psychodiagnosis and control of psychological conditions are needed. Socio-psychological methods of control of the operator condition and the activities of operators groups could be used effectively. Mathematical models for analysis need to be developed along with rehabilitation methods of negative psychic states.
[553-7813]

BIO-FEEDBACK METHODS AND QUALITY OF OPERATOR'S PERFORMANCE

Moscow PSIKHOLOGICHESKIY ZHURNAL in Russian Vol 5, No 2, Mar-Apr 84
(manuscript received 24 Jan 83) pp 85-91

FROLOV, M. V., GLAZKOVA, V. A. and KHACHATUR'YANTS, L. S., Institute of Higher Nervous Activity and Neurophysiology, USSR Academy of Sciences

[Abstract] Quality of operator's performance depends substantially on the functional state of the individual and on his emotional stress. With increasing complexity of any given task, optimal levels of emotional stress are lowered. A series of methods exists by which the "psychological error" may be lowered. An instruction method was proposed in the system of biofeedback to a random direction by the functional state based on the laws of adaptive selfregulation. A model was developed with a work schedule leading to a stress of the operator. Four stage experiments were performed: 1) training of the test subjects to solve the operator's tasks (OT): 2) modelling of OT under stress conditions; 3) education of subjects on controlling their emotional conditions by the biofeedback methods, and 4) modelling of OT under stress. The data obtained showed that the skin-galvanic reactions diminished gradually during the period of training, indicating diminished emotional stress of the tested subjects. After BFS, the test subjects performed better, they were more relaxed and their work was more accurate. After training in the BFB system, errors in solving OT dropped considerably, and the physiological exertion in solving various problems dropped also. Figures 4; references 5: 2 Russian, 3 Western.
[553-7813]

UDC 612.017.1:579.842.14]:612.6.052

GENETIC CONTROL AND PHENOTYPIC CORRECTION OF CELLULAR IMMUNE RESPONSE TO
H-ANTIGEN OF SALMONELLA TYPHIMURIUM

Moscow PATOLOGICHESKAYA FIZIOLOGIYA I EKSPERIMENTAL'NAYA TERAPIYA in
Russian No 4, Jul-Aug 83 (manuscript received 7 Feb 83) pp 32-34

NASYROV, A. A., ALEKSEYEVA, N. Yu., MOSHIASHVILI, I. Ya. and KHAITOV, R. M.,
Institute of Biophysics, USSR Ministry of Health, Moscow

[Abstract] Genetic determinancy of cellular immune response to H-antigen (H-AG) of *S. typhimurium* was studied along with possibilities of correcting it by a series of synthetic polyelectrolytes. The experiments were performed on CBA, C57Bl/6I, CC57W, A/Sn mice and on (CBAXC57BL/6I) F_1 hybrids. The highest inhibition of macrophage migration was observed during immunization of mice with 60 μ g dose of H-AG. The highest quantity of the factor inhibiting migration (FIM) produced by lymphocytes was observed 6 days after immunization with H-AG, on the CBA mice and on (CBAXC57BL/6I) F_1 hybrids; the lowest--on the A/Sn and CL57W mice. Phenotypic correction of cellular and humoral immune response could be achieved with synthetic polyelectrolytes, the best effect being achieved with the copolymer of acrylic acid and N-vinylpyrrolidone. Figures 2; references 11: 6 Russian, 5 Western.
[467-7813]

UDC 612.112.94.017.1-063

MODELLING OF MULTI-SIGNAL IMMOBILIZED IMMUNOGENS

Moscow PATOLOGICHESKAYA FIZIOLOGIYA I EKSPERIMENTAL'NAYA TERAPIYA in Russian
No 4, Jul-Aug 83 (manuscript received 8 Apr 83) pp 73-82

KASHKIN, K. P. and LIOZNER, A. L., Institute of Immunology, USSR Ministry of
Health, Moscow

[Abstract] One of the more important tasks of contemporary immunology is the development of ways and means of managing the immune response of organisms. One of the ways of affecting immune response is through the synthetic antigenic macromolecules, the so-called artificial immunogens. In constructing artificial immunogens, haptens are combined with carriers whose properties

determine the immune response. Polyfunctional antigens capable of inducing humoral immune response with little cooperation from the T helper cells were called thymus independent antigens (TI). During primary immune response TI antigens stimulate formation of antibodies of the IgM isotype but almost no formation of IgG antibodies and immunologic memory. To activate B-lymphocytes, TI-antigens must possess functionally-active groupings: antigen-specific and B-mytogetic determinants and a determinant fixating C3 component of the complement. Among several models for obtaining artificial immunogens capable of giving out a spectrum of signals for activation of B-lymphocytes, the immobilization of antigenic (haptens) determinants on polystyrene sorbent was discussed, reviewing appropriate literature. Figures 3; references 36: 8 Russian, 28 Western.
[467-7813]

LACK OF AN EFFECT OF CORPUSCULAR VACCINE AGAINST I PHASE Q-FEVER ON PERSISTENCE AND REACTIVATION OF COXIELLA BURNETII INFECTION IN MOUSE AND GUINEA PIGS TISSUE

Bratislava ACTA VIROLOGICA in Russian Vol 27, No 5, Sep 83 (manuscript received 2 Jun 82) pp 418-428

KAZAR, J. and KOVACOVA, E., Institute of Virology, Slovak Academy of Sciences, Bratislava, Czechoslovakia

[Abstract] Presence of *C. burnetii* was investigated in the tissues of mice and guinea pigs immunized with corpuscular vaccine against I phase Q-fever, 1-6 months after infection with *C. burnetii*. Other experimental groups included animals injected with cortisone or cyclophosphamide (CPA) and mice which became pregnant during the course of these experiments. During early stages of infection, large quantities of rickettsiae accumulated in spleen and in liver. With time, these organs were cleared of these infectious agents but during the late stages of infection, it still persisted in reproductive organs and in kidneys. The persistence of *C. burnetii* was not affected by immunization with the vaccine against Q-fever. Treatment with cortisone appeared to increase production of I and II phase antibodies; treatment with CPA led to a decreased level of antibodies. References 24: 2 Russian, 22 Western.
[509-7813]

USE OF RADIAL HEMOLYSIS METHOD IN GEL FOR DETECTION OF ANTIBODIES TO BUNYA VIRUS LEDNICE (TURLOCK VIRUS GROUP)

Bratislava ACTA VIROLOGICA in Russian Vol 27, No 5, Sep 83
(manuscript received 10 Dec 82) pp 439-441

MALKOVA, D., KRPESOVA, N., HOLUBOVA, J. and KOLMAN, J. M., Institute of Parasitology, Czechoslovak Academy of Sciences, Prague, Czechoslovakia

[Abstract] Due to its simplicity, specificity and economy, the reaction of radial hemolysis in gel (RHG) was used to detect antibodies in experiments with the Lednice 6118 virus of the Turlock group, Bunyaviridae family. This method gave reliable and specific results. No mass reactivity was noted with sera of other arboviruses (Sindbis, ZN, Tahyna, Caloco and tick encephalitis virus). Comparison of antibody titres obtained in reactions in RHG, hemagglutination inhibition reaction and indirect immunofluorescence showed that RHG was a sensitive reaction. References 9: 1 Russian, 8 Western (1 by Russian authors, 3 by Czech authors).
[509-7813]

UDC 616.993.161-092:612.017.1

CLINICAL-IMMUNOLOGICAL SPECTRUM OF LEISHMANIASIS

Moscow MEDITSINSKAYA PARAZITOLOGIYA I PARAZITARNYYE BOLEZNI in Russian
No 5, Sep-Oct 83 (manuscript received 18 Jun 82) pp 3-10

SHUYKINA, E. Ye., Institute of Medical Parasitology and Tropical Medicine imeni Ye. I. Martsinovskiy, USSR Ministry of Health, Moscow

[Abstract] The concepts of vertical and horizontal spectra of infections are important ideas for the understanding of infectious pathology and immunology. Select characteristics of clinical-immunological spectra of Leishmaniasis were analyzed on the basis of clinical manifestations, the response to infection and on the type of immunodepression. Two groups were identified: infections caused by *L. donovani* and those caused by the dermatotropic species. The infections caused by *L. donovani* were characterized by typical clinical manifestations, clearly expressed B-system immunity function, reversed T-system energy towards various antigens and abortive forms or latent carrying potential in which the participation in the acquired response was due to both systems of immunity with preponderance of the T-system. In cases of cutaneous leishmaniasis the diffuse and tuberculoid forms were polar, depending on the type of acquired response (B or T). In these forms, immunodepression was irreversible. The other cutaneous and noncutaneous leishmaniasis involved both systems of immunity and therefore were intermediate between the poles of the spectrum of activities. References 46: 15 Russian, 31 Western.
[556-7813]

RELATIONSHIP BETWEEN CARDIOVASCULAR SYSTEM RESPONSE AND ADRENOCORTICAL
GLUCOCORTICOID FUNCTION ON EXPOSURE TO DIFFUSE, LOW-INTENSITY HELIUM-NEON
LASER EMISSION

Moscow GIGYENA TRUDA I PROFESSIONAL'NYYE ZABOLEVANIYA in Russian No 11,
1983 pp 47-48

[Article by I. N. Ushkova, L. A. Pokrovskaya, G. S. Stepanov, I. M. Suvorov,
M. Ye. Kogan, and Ye. F. Grishina, Institute of Labor Hygiene and Occupational
Diseases; Institute of the Breeding and Genetics of Agricultural Animals,
Sanitary-Hygiene Medical Institute, Leningrad]

[Text] In connection with the appearance of a new occupational-production
factor--laser emission--in industry, labor hygiene faces the task of
establishing the regulation of intensity and work time, and studying the
pathogenesis of exposure to this radiation on the body of the worker.

The present experiment investigated the effect of light from a low-intensity
helium-neon laser on the formation of a series of adaptative processes in
the body.

The study was carried out on 32 chinchilla rabbits, weighing 2-2.5 kg. The
right eyes of the creatures were subjected to diffuse laser radiation,
wavelength 0.6328 micrometers, for 30 days, 14 minutes per day, under condi-
tions of low illumination. The light was made diffuse with opal glass; the
diameter of the light spot on the rabbit's retina was 600-800 micrometers.
An LG-38 helium-neon laser was used, with power flux density $2 \cdot 10^{-5}$ watts/cm²
(I. N. Ushkova and E. A. Dvorkin). Controls were rabbits under the same
conditions, but not exposed to laser radiation.

The animals were weighed throughout the experiment. In order to isolate the
early glucocorticoid response to the treatment, the hydrocortisone content
of the blood was determined at 1 and 2 hours after exposure to laser emission
on the 1st and 2nd days of the study. This test was subsequently made on
the 3rd, 4th, 5th, 6th, 10th, 20th, and 30th days, which permitted judgement
on presence of a functional cumulation effect.

The hydrocortisone was determined by the radioimmunological method. A tritium-marked hydrocortisone preparation made by the Amersham firm was employed. The radiometry was carried out on an Ultra-beta 1280 liquid scintillation counter. On the 1st, 5th, 10th, and 30th days of treatment, recordings were made of a second-lead electrocardiogram and the arterial pressure in the femoral artery in order to determine and calculate the following values. For the curve of the cardiac rhythm based on measurements of 50 cardiocycles R-R by the R. K. Bayevskiy method, calculations were made of the amplitude of the mode (AM_0), the variation range (Δx), the stress index (SI), the frequency of cardiac contraction (FCC), three aspects of arterial pressure--maximal (M), minimal (m), and average dynamic (AD), the length of the expulsion phase (E), stroke volume (SV), the minute volume of the blood (MVB), and total peripheral resistance (TPR).

Over the first five days after exposure, a weight loss of 5.7 percent was observed in the experimental group and an increase of 1.4 percent in the controls. For two weeks before the beginning of the experiment, animals of both groups were put into stalls approximating the conditions of the experiment. The basic hemodynamic indicators are presented in the table.

1 Показатели гемодинамики животного при действии светом лазера ($M \pm m$)

2	Группа животных	3	4	5			7	8	9	10
				М	м	СД				
	День ис-следования	ЧСС, уд/мин	мм рт. ст.				Е, с	УО, мл	МОК, мл/мин	ОПС, дин·с/см ²
11	Интактные	—	240±25	118±4	72±3	88±3	0,14913±0,00789	1,6±0,15	443±28	17 182±1543
12	Подопытные	5-й	217±25	<u>98±2</u>	68±3	81±4	0,14139±0,00520	1,5±0,17	316±68	21 116±1991
		10-й	300±21	<u>105±5</u>	69±3	81±3	0,13805±0,00686	1,4±0,10	429±39	15 585± ± 1 161
		20-й	273±37	123±5	75±6	91±6	0,15523±0,01078	1,9±0,16	526±96	15 266± ± 1 839
13		30-й	239±26	<u>96±4</u>	68±3	74±3	0,13309±0,00784	1,3±0,08	<u>312±37</u>	17 009± 1 533

14 Примечание. Подчеркнуты статистически значимые различия ($P < 0,05$).

Key:

1. Hemodynamic indices of animals exposed to laser emission ($M \pm m$)
2. Animal group
3. Day
4. FCC, beats/min
5. AD
6. mm Hg
7. E, seconds
8. Sv, ml
9. MVB, ml/min
10. TPR, dyne sec/cm²
11. Control
12. Experimental
13. 5th, 10th, 20th, 30th
14. Note. Statistically significant differences are underlined ($P < 0.05$).

During the experiment, the phase nature of the changes was evident, probably based on stress of nonspecific mechanisms of the body in response to the treatment. Decreased M and MVB, and lower pulse frequency on the 5th day of the experiment alternated with a slight increase of these indicators by the 10th and especially on the 20th day of the experiment, with another decrease on the 30th day of exposure.

The hydrocortisone content in the blood on exposure to laser radiation changed on the 1st, 2nd, 3rd, 4th, 5th, 6th, 10th, 20th, and 30th days and totalled, respectively (as a percentage of the control), 179, 410, 123, 219, 268, 80, 84, 84, 84 (a dash under the figure signifies a clear change with $P < 0.05$).

These tests revealed the increased level of hydrocortisone in the first days, especially on the 2nd and 5th days of the experiment, and the subsequent decrease.

An assessment of the state of regulatory mechanisms of the cardiovascular system in connection with the activity of the sympathetic and parasympathetic links of the autonomic nervous system was made based on analysis of the length of cardiac intervals. Predominance of the parasympathetic branch of the autonomic nervous system in the regulation of the body functions under investigation in the early days of the study was conclusively shown. SI dropped to 18.4 percent of the control for this period. On the 10th day of the experiment, there was a 16.1 percent SI increase, and subsequent 25 percent decrease by the 13th day.

In generalizing the results of the research, it must be noted that there is a phase quality in the course of processes in the body's response to exposure to diffuse helium-neon laser emission, so that, despite the absence of a marked response in the first phase, there is a change in the homeostatis level (G. N. Kassil').

Against a background of heightened excretions of hydrocortisone by the adrenal glands, there is a slight weight loss (5.7 percent), and predominance of the parasympathetic branch of the autonomic nervous system in the regulation of the cardiovascular system: lower SI, MVB, and M, and a slight decrease of FCC. The calculated coefficients of pair correlation between hydrocortisone content in the blood and MVB, FCC, and M amounted to 0.69, 0.61, and 0.52, respectively. All this testifies to the development of a catabolic effect in the first days of exposure.

With further analysis of research results, it can be established that the phase described alternates with a state characterized by lower excretions of hydrocortisone and normalization of the system's hemodynamics with the increased stress of the sympathetic nervous system. The 30th day of the experiment is characterized by the development of an adaptive-compensatory reaction in the body.

Comparing these experimental data with clinically-observed changes (A. A. Komarova, et al.; I. M. Suvorov et al.), we may conclude that the manifestation of the effect of helium-neon laser emission inherent to the clinical stage of fluctuation of neuroregulatory mechanisms may be a reflection of the phase character of shifts in the neuroregulatory system.

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CSO: 8144/1261

UDC 615.471:616.15-07:615.849.19

LASER CELL ANALYZER

Moscow MEDITSINSKAYA TEKHNIKA in Russian No 6, Nov-Dec 83 (manuscript received 25 Oct 82) pp 11-16

LATYPOV, Z. Z. and SKVORTSOVA, N. O., All-Union Scientific Research and Design Institute of Medical Laboratory Technology, Leningrad

[Abstract] A laser counter of biological cells and transparent particles in suspension was developed and a prototype was constructed of relative simplicity, yet possessing a number of advantages over analogous equipment in existence. The counting is based on detection of light scattered from the particles within an angle range of 20-40°C. The selected geometry of the optical system yields a high signal level at a 3 mW power of the laser source and relatively small overall dimensions of the counter. A newly-developed flow-through cuvette with hydrodynamic focusing of the suspension assures more rapid counting and analysis rates of the particles providing a potential for studies and for diagnosis of cellular populations by histograms. Figures 3; references 4: 1 Russian, 3 Western.
[470-7813]

UDC 616.721.4-018.3-085.849.19+616.814.1

LASER ACUPUNCTURE IN TREATMENT OF NEUROLOGIC MANIFESTATIONS OF VERTEBRAL OSTEOCHONDROSIS

Moscow VOPROSY KURORTOLOGII, FIZIOTERAPII I LECHEBNOY FIZICHESKOY KUL'TURY in Russian No 2, Mar-Apr 83 (manuscript received 9 Aug 82) pp 29-32

MACHERET, Ye. L., BELOUSOVA, I. A., ZALESSKIY, V. N., SAMOSYUK, I. Z. and KORKUSHKO, A. O., Kiev Institute for the Advanced Training of Physicians

[Abstract] An attempt was made to develop an effective treatment for patients who suffer from osteochondrosis of the peripheral nervous system. A laser beam was aimed directly at the receptor system in the area of local and regional acupuncture points (AP) using a monofiber quartz light-guide built

into a specially designed acupuncture needle coupled with mechanical stimulation of the needle after its insertion into the tissue. In this fashion the losses from reflection and dispersion of light are minimized, focusing directly on the AP; as a result, an improved therapeutic effect was noted. References 13: 8 Russian, 5 Western.
[463-7813]

UDC 613.645+614.7]:621.375.826]:614.374

HEALTH EDUCATION OF POPULATION IN CONNECTION WITH WIDESPREAD USE OF LASER RADIATION

Moscow GIGIYENA I SANITARIYA in Russian No 12, Dec 83 (manuscript received 14 Apr 83) pp 35-37

KASHUBA, V. A. and BYKHOVSKIY, A. V., Moscow Medical Stomatologic Institute imeni N. A. Semashko

[Abstract] Rapid development of laser technology and its adaptation in many areas of national economy make it mandatory to develop a state system of laser safety. Due to absence of visible injuries of those working with laser equipment, a certain degree of bravado has developed among the technical personnel servicing laser instruments. There are no courses available for technicians and professionals concerning safety procedures. To solve this problem, a coordinated program must be organized country-wide with cooperation of physicians, labor safety specialists, preventive medicine experts and hygienists. Stressing the preventive aspects, this effort should lead to development of sound habits and proper technical knowhow. References 6: Russian.
[532-7813]

UDC 535.231.15

LASER DOPPLER SPECTROSCOPY OF BIOLOGICAL OBJECTS

Moscow BIOLOGICHESKIYE NAUKI in Russian No 7, Jul 83 (manuscript received 17 Mar 82) pp 29-37

POSUDIN, Yu. I., Department of Physics, Ukrainian Agriculture Academy

[Abstract] Basic principles of laser Doppler spectroscopy are reported along with the results of spectral and autocorrelational measurements of movement parameters of a series of biological objects. The most characteristic examples of the use of massive and individual methods were used to show the potential and precision of laser Doppler spectroscopy. The paper covers the subject and the methods of laser Doppler spectroscopy, its mathematical and physical principles, the spectrum and autocorrelation function of light scattering and of the photoflow, spectral and autocorrelative determinations

and finally individual and massive methods of determining photomobility of microorganisms. Laser Doppler spectroscopy is an unique and highly precise instrument for studying biological objects. The level of its monochromatic source, spacial coherence and intensity make it possible to study problems which have been impossible with classical spectroscopy and microscopy. Figures 8; references 16: 3 Russian, 13 Western.
[550-7813]

UDC 633.16:631.52

MUTAGENIC EFFECT OF HELIUM-NEON LASER RADIATION ON SPRING BARLEY

Moscow GENETIKA in Russian Vol 19, No 10, Oct 83 (manuscript received 2 Mar 82, after final revision 11 Mar 83) pp 1693-1699

DUDIN, G. P., Department of Selection and Seed Growing, Kirov Agricultural Institute

[Abstract] Dry and prewetted seeds of "Luch" barley were irradiated for 30, 60 and 90 min with helium-neon laser OKG-12-1 with a 1 mW/cm² power. Families were isolated with up to 10 new formations in M₂. In M₃ the effect of laser beam was dose related: in dry state a 30 min exposure led to 0.43% mutation, at 60 min to 1.76% and after 90 min to 2.19%; in the wet state the same exposure times produced 2.11, 2.37 and 3.15% mutations respectively. Four mutants were isolated with valuable properties in respect to early ripening, productivity, resistance to infections and elevated protein level. Thus, it was shown that laser beam affects genetic apparatus of spring barley. Laser radiation can produce mutants with considerable deviations from original properties. References 23: 21 Russian, 2 Western.
[538-7813]

UDC 612.2:612.014

ACTIVITY OF RESPIRATORY SYSTEM DURING LASER IRRADIATION OF BRAIN STRUCTURES

Moscow BIOLOGICHESKIYE NAUKI in Russian No 8, Aug 83 (manuscript received 15 Sep 81) pp 47-51

MERKULOVA, N. A. and SERGEYEVA, L. I., Department of Human and Animal Physiology, Kuybyshev State University

[Abstract] The performance of one of the principal links of the respiratory system, the respiratory center, was studied as a function of the exposure of the medulla oblongata and the sensomotor zone of the cerebral hemisphere cortex to low level laser irradiation in the red wavelength of the spectrum. Experiments were done on white rats under barbital anesthesia. It was shown that under such conditions a substantial effect was observed on the activity of the respiratory center. Laser light may display activating or inhibitory

influences; in some cases the bilateral symmetry of the activity of respiratory center is affected indicating deep changes in the integrative mechanism of the functioning of the right and left sides of the hemispheres. The laser beam effect depends on many factors: specific light properties, duration of the exposure, repetition of exposures, initial functional state of the CNS, etc. Figures 3; references 18: Russian.
[552-7813]

UDC: 591.171+599.537

MATHEMATICAL AND BIOLOGICAL MODELS OF LOCOMOTION BY CETACEANS

Kiev VISNYK AKADEMIYI NAUK UKRAYINSKOYI RSR in Ukrainian No 1, Jan 84 pp 9-17

[Article by Doctor of Technical Sciences L. P. Kozlov; passages highlighted by use of double-spaced words are enclosed in slantlines]

[Text] Biological hydrodynamics, which arose at the juncture of the basic sciences of biology and hydrodynamics, is a branch of knowledge in which an aggregate of theoretical and experimental methods of hydrodynamics is utilized to study biological subjects and systems. Soviet biohydrodynamics is grounded on the works of academicians V. V. Shuleykin [1] and M. O. Lavrent'yev [2]. UkSSR Academy of Sciences Academician G. V. Logvinovich [3] utilized the basic principles of slender-body hydrodynamics to formulate a theory of locomotion of aquatic animals, and with this made a substantial contribution to this field of science. Also of considerable importance is the work done by foreign scientists D. Grey, M. Lighthill, and T. Wu. Hydrodynamics of locomotion of aquatic animals, particularly freshwater and marine fishes [4], as well as cetaceans, has experienced considerable development at establishments of the UkSSR Academy of Sciences.

/Hydrodynamic characteristics of cetaceans./ These animals include the slow dolphins (beluga, pilot whale) and whales (right, humpback, gray), as well as the relatively fast dolphins (Atlantic white-sided dolphin, Atlantic bottlenose dolphin, killer whale, right whale dolphin) and whales (blue, fin whale, sei whale). Cetacean locomotion is a nonsteady-state hydrodynamic process, and even with translational rectilinear displacement of the body's center of gravity, it is of a periodic oscillatory nature. Cetaceans possess an integrated propulsion hydrodynamic complex, which consists of a nicely streamlined and considerably deformed body and a two-lobed tail fin or fluke (principal propulsive device), which oscillates in a vertical plane at a frequency of 0.2-2.0 oscillations per second. Their body shape is close to that of a variable-configuration solid of revolution. The fast dolphins have a well-streamlined body shape with a laminar elongation profile [5]. The body surface is smooth. The damping integument presents a complex cellular structure, containing sensitive papillae and microscopic channels with a viscous liquid accumulator. Figure 1 (according to the data of Academician V. Ye. Sokolov) [5-7] shows the structure of cetacean integument. The dorsal fin, flippers and tail fluke act as stabilizers and steering controls for horizontal and vertical maneuvers. Thus cetaceans possess a unique body structure from the standpoint of their adaptation to fast locomotion and maneuverability. A dolphin, for example, is capable of traveling for short periods up to speeds of 11 m/s [7].

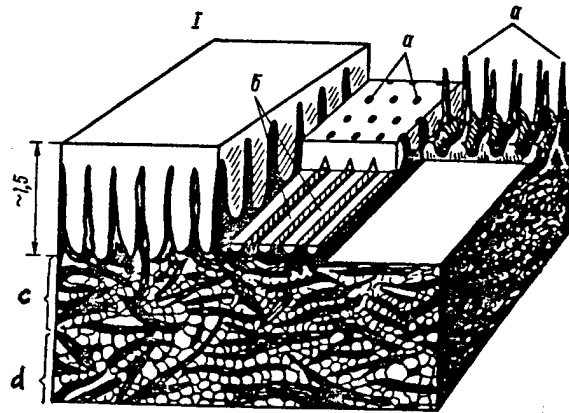


Figure 1. Diagram of Microscopic Cross Section of the Skin of Cetaceans (after V. Ye. Sokolov, 1955): a -- dermal papillae; b -- lengthwise epidermal partitions, channels between them; c -- subpapillar dermal layer; d -- subcutaneous fat cellular tissue.

/Mathematical model with crescent-shaped tail fluke/ [8]. We shall compute the forces acting on the tail fluke of a marine animal viewed as an oscillating rigid wing of great length. Figure 2 contains a diagram of velocities and forces applied to the tail fluke. It is evident from the diagram that the instantaneous thrust coefficient of the tail fluke is equal to

$$C_a = C_L \left(\frac{\partial \eta}{\partial t} \frac{1}{v} + \varphi \right) - C_{D_i}, \quad (1)$$

where $\eta(x, t)$ is the deviation of the marine animal's midline from the y axis, C_L is the lift coefficient, C_{D_i} is the induced-drag coefficient, t -- time, $\partial \eta / \partial t$ -- transverse velocity of the marine animal's midline, v -- swimming speed, φ -- angle of tail fluke rotation relative to the direction of instantaneous velocity of the midline.

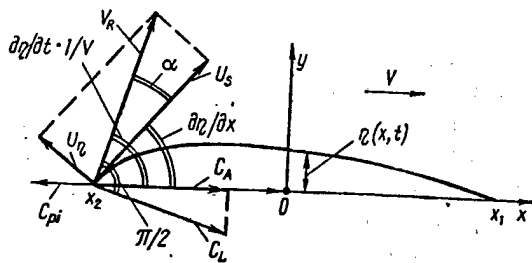


Figure 2. Diagram of Velocities and Forces for the Tail Fluke of Cetaceans

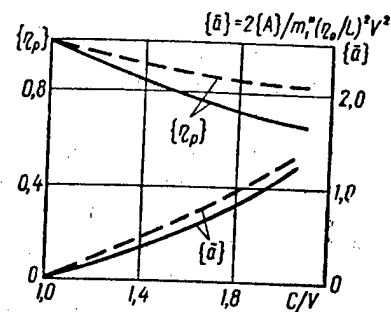


Figure 3. Dependence of the Hydrodynamic Efficiency and Dimensionless Thrust Coefficient $2\{A\}/m_1 \cdot \left(\frac{\eta_0}{L}\right)^2 v^2$ on the Value of Relative Velocity of Propulsive Zone C/V

Analysis of a series of motion-picture frames showing the locomotion of cetaceans, especially dolphins, indicated that the amplitude of oscillation of their body changes in approximately linear fashion along the length of the body from the tip of the nose to its greatest value in the vicinity of the tail fluke. In other words, there is reason to believe that the following can be utilized to describe the oscillation.

$$\eta(x, t) = \eta_0 \frac{x_2 - x}{L_p} \sin\left(\frac{ct}{L} - \frac{x_2 - x}{L}\right), \quad (2)$$

where η_0 is the amplitude of oscillations of the rearmost point on the tail fluke, L -- length of the wave which runs along the body of the marine animal, n -- number of waves falling along the length of the body of the marine animal, c -- velocity of propagation of traveling wave, $L_p = 2\pi L n = x_2 - x_1$ -- length of marine animal's body.

It is evident from the diagram (Figure 2) that for angle of attack

$$\alpha = -\frac{V_n}{V} = \frac{1}{V} \left(\frac{\partial \eta}{\partial t} - V \frac{\partial \eta}{\partial x} \right), \quad (3)$$

where V_n -- normal component of velocity of the rearmost point on the tail fluke. Assuming values $C_L = 2\pi \lambda \alpha (\sqrt{\lambda^2 + 4} + 2)^{-1}$ (according to the well-known formula of Professor K. K. Fedyayevskiy) and $C_{D1} = (\pi \lambda)^{-1} C_L$ -- for an optimal wing with aspect ratio λ , and also assuming in a first approximation $\phi = 0$, we obtain the following average tractive force value

$$\{A\} = \frac{2m^*}{V\lambda^2 + 4 + 2} \left(\frac{\eta_0}{L} \right)^2 V^2 \left\{ \frac{C}{V} \left(\frac{C}{V} - 1 \right) + \frac{4}{V\lambda^2 + 4 + 2} \left[\frac{1}{2} \left(\frac{C}{V} - 1 \right)^2 \right] \right\}; \quad (4)$$

suction force

$$\{P\} = \frac{m^*}{4} \left(\frac{\eta_0}{L} \right)^2 V^2 + \frac{m^*}{12} \left(\frac{\eta_0}{L} \right)^2 V^2 \left(\frac{C}{V} - 1 \right)^2; \quad (5)$$

kinetic energy which flows off the tail fluke into a hydrodynamic wake,

$$\{E\} = \frac{m^*}{4} \left(\frac{\eta_0}{L} \right)^2 V^3 + \frac{m^*}{4} \left(\frac{\eta_0}{L} \right)^2 \frac{(x_2 - x_1)}{L_p} \left(\frac{C}{V} - 1 \right)^2 V^3; \quad (6)$$

hydrodynamic efficiency

$$\{\eta_p\} = \frac{(\{A\} + \{P\}) V}{(\{A\} + \{P\}) V + \{E\}} =$$

$$\begin{aligned}
& \frac{2}{V\lambda^2 + 4 + 2} \left\{ \frac{C}{V} \left(\frac{C}{V} - 1 \right) - \frac{4}{V\lambda^2 + 4 + 2} \left[\frac{1}{2} + \left(\frac{C}{V} - 1 \right)^2 \right] \right\} + \\
& \quad + \frac{1}{12} \left(\frac{C}{V} - 1 \right)^2 + \frac{1}{4} \\
= & \frac{2}{V\lambda^2 + 4 + 2} \left\{ \frac{C}{V} \left(\frac{C}{V} - 1 \right) - \frac{4}{V\lambda^2 + 4 + 2} \left[\frac{1}{2} \left(\frac{C}{V} - 1 \right)^2 \right] \right\} + \\
& \quad + \frac{1}{3} \left(\frac{C}{V} - 1 \right)^2 + \frac{1}{4} \quad (7)
\end{aligned}$$

In expressions (4-7) $m_1^* = \rho \pi R^2$ mass at the rearmost point is added, ρ -- density of the liquid, R -- half a fluke sweep. With formulas (4)-(7) we shall compute the relations of hydrodynamic efficiency $\{\eta_p\}$ and dimensionless thrust coefficient $2\{A\} / m_1^* (\frac{\eta_p}{L})^2 v^2$ for different values of relative velocity of traveling wave q_v . Figure 3 contains such relations for cetaceans with tail fluke with aspect ratio $\lambda = 4$.

We should note that when computing the hydrodynamic efficiency of the tail fluke of cetaceans with formula (7), one should take into account the effect of the animal's body on the work performed by the fluke. Experiments have shown that for cetaceans the body influence coefficient can be assumed equal to 1, that is, the body of cetaceans, from the standpoint of generating propulsive thrust, has virtually no effect on the work performed by the tail fluke.

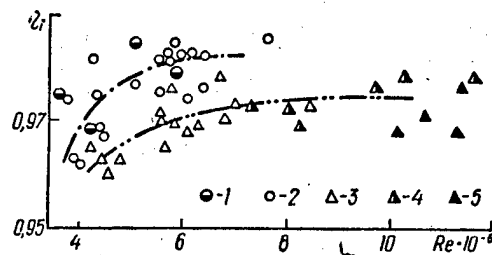


Figure 4. Relationship Between Ideal Hydrodynamic Efficiency of Dolphin Tail η_i and Reynolds Number $Re = VL/v$ for various accelerations m/c^2 : 1 -- (-0.10 - 0.03); 2 -- (-0.2 - 0.08); 3 -- (0.10 - 0.30); 4 -- 0.35 - 0.70; 5 -- (0.75 - 1.50)

A similar mathematical model of cetacean locomotion is employed in [9]. However, the values of amplitudes of body oscillation η and tail angle of attack α were taken from figures of actual measurements of dolphin swimming kinematics, while the lift coefficients were taken from wind-tunnel figures on wings analogous to a fluke.

Based on these assumptions, on the basis of the results of investigations of actual kinematics of swimming locomotion, ideal hydrodynamic efficiency values were calculated, which for the Atlantic bottlenose dolphin, depending on Reynolds number in different acceleration conditions, are presented in Figure 4. It follows from the graph that in a regime of active swimming with positive

accelerations, when the propulsive thrust developed by the tail fluke exceeds the hydrodynamic drag of the surrounding medium, the hydrodynamic efficiency of the tail fluke is somewhat less than during uniform locomotion. As swimming speed increases there is a tendency toward increase in hydrodynamic efficiency. For example, during steady locomotion of an Atlantic bottlenose dolphin with a Reynolds number equal to 4×10^6 , ideal hydrodynamic efficiency is 0.965, while the corresponding quantity with a Reynolds number 7.7×10^6 is 0.980; that is, hydrodynamic efficiency increases by 1.5 percent.

/Mathematical model of cetacean gliding on waves/ [10]. The phenomenon of cetaceans riding the swell has long been observed. It is believed that the profile of ocean swell is described by trochoidal Gerstner waves of finite amplitude. In addition, the three following hypotheses are employed: independence of wave pressure field of the presence of the body of the marine mammal in it; the mammal's center of gravity glides along the free water surface; cetaceans on a wave slope move together with it at the wave propagation velocity. In this instance Figure 5 contains a diagram of forces acting on the body of a marine mammal, where P -- gravity; R -- generalized Archimedean buoyancy force; C -- velocity of wave movement; U -- speed of locomotion of marine mammals; θ -- angle of wave slope. Expressions have been obtained on the basis of these hypotheses, expressions for calculated wavelength λ_{np} at which cetaceans can glide on a swell, as well as boundary velocity of wave propagation

$$\frac{\lambda_{np}}{L} \leq 40, \quad (8)$$

$$U_{np} = 1,25 \sqrt{\lambda_{np}}, \quad (9)$$

at which cetaceans can displace without bioenergetic expenditures.

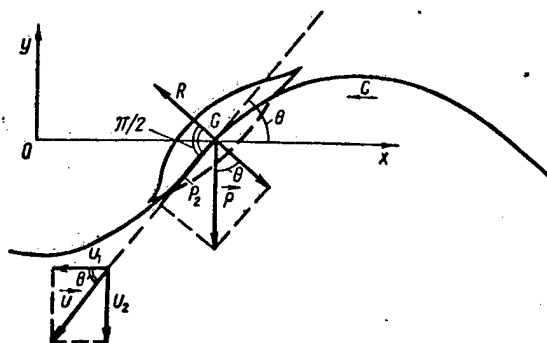


Figure 5. Diagram of Forces and Velocities During Riding of Swell by Cetaceans

We reached the following conclusions: cetaceans more than 5 meters in length for all practical purposes cannot utilize the wave energy of ocean swell for locomotion without energy expenditures; small cetaceans, such as the harbor porpoise, Atlantic white-sided dolphin, or Atlantic bottlenose dolphin, for example, are capable of utilizing a light, moderate, or substantial swell for "riding" the waves. Speed of locomotion for the above-named species, with a body length of 1.5-2.0 meters, runs to 10-12 m/s for a fairly extended period of travel.

These speeds are considerably greater than those achieved by means of bioenergetic capabilities; large cetaceans, such as the killer whale, are propelled by the wave energy of swells driven by a strong breeze, moderate gale, or even strong gale to travel at fantastic speeds -- in excess of 17-19 m/s -- for a practically unlimited period.

The above conclusions must be considered when analyzing the speeds of locomotion of cetaceans observed riding a swell.

/A bioenergetic model of locomotion/ [11-17]. A quantitative estimate of the hydrodynamic characteristics of swimming marine animals, such as cetaceans, can be made as follows. Hydrodynamic drag coefficient can be computed with known active component of power output which a marine mammal develops during the course of a certain period of time, as well as known weight, principal geometric characteristics, and actual speed of locomotion. This idea was first articulated and implemented by D. Grey.

We shall obtain the following exponential function in order to compute the power of pure energy expenditures on movement and performance of work for cetaceans [16]:

$$N(p, t) = 0,19t^{-\frac{1}{3}}p^{\frac{2}{3}}, \quad (10)$$

where t is duration of load application in seconds, p -- animal's weight in kilograms. Formula (10) is in fairly good agreement with figures on power produced by dolphins obtained by D. Zhiro and S. V. Pershin [18] by processing motion-picture frame sequences of leaps performed by these mammals (Figure 6).

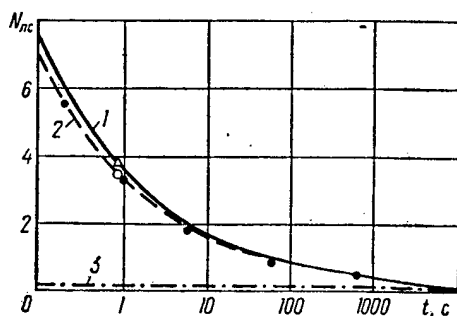


Figure 6. Comparison of Results of Calculations of Bioenergetic Expenditures (based on known data for athletes): 1 -- with formula (10); 2 -- output, metabolism at rest (figures for athletes, results of recomputation for dolphins after Pershin and Zhiro and recomputation of Grey's figures respectively)

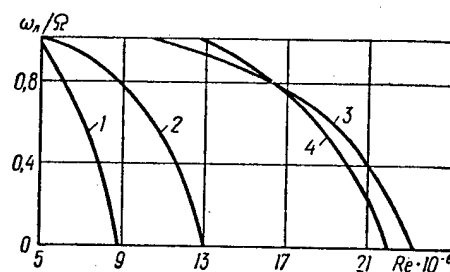


Figure 7. Relationship Between Extent of Laminar Regions in the Boundary Layer of Cetaceans and Actual Reynolds Number: 1 -- harbor porpoise; 2 -- Pacific bottlenose dolphin; 3 -- Atlantic white-sided dolphin; 4 -- Atlantic bottlenose dolphin

Comparing bioenergetic output obtained with formula (10) for cetaceans with power output computed with the general principle of hydromechanics (Newton's principle), in the form

$$N = \frac{\rho_s}{2\eta} \zeta \delta, V^3 L^2, \quad (11)$$

(here ρ_s -- water density, η -- propulsive coefficient equal to the ratio of useful power expended on producing propulsive thrust to the active component of power developed by a marine mammal, $\delta_1 = \Omega/L^2$, Ω -- area of wetted surface of marine mammal, ζ -- a hydrodynamic drag coefficient, dependent on streamline flow regime), we obtain formulas for computing cetacean locomotion speed:

with completely laminar flow regime

$$V_n = 11,26 t^{-0,133} L^{0,2}, \quad (12)$$

with completely turbulent flow regime

$$V_r = 5,39 t^{-0,166} L^{0,05}. \quad (13)$$

On the other hand, when actual locomotion speeds and duration are known, with formulas (10-11) one can determine the relative extent of laminar w_n/Ω and turbulent regions in the boundary layer of marine animals.

Such computations can be performed, solving the equation

$$\left\{ 0,0307 \text{Re}_A^{-\frac{1}{7}} \left[1 - \left(\frac{w_n}{\Omega} \right)^{0,8} \right] + 1,328 \text{Re}_A^{-\frac{1}{2}} \left(\frac{w_n}{\Omega} \right)^{0,5} \right\} \text{Re}_A^3 t^{0,5} = \\ = 2,75 \cdot 0,14 \frac{\delta^{0,5}}{\delta_1} \left(\frac{BH}{L^2} \right)^{0,5} \frac{\gamma_s^{0,5}}{\rho_s} \frac{\eta}{K} L^{2,5}, \quad (14)$$

where $\text{Re}_A = V_n L / \nu$ -- actual Reynolds number, V_n -- actual speed of locomotion, L , B , and H -- principal dimensions of marine animal, V -- block coefficient, K -- shape factor, which is the ratio of total viscous drag to friction drag of an equivalent flat plate. Figure 7 contains the indicated results of computations for different dolphin species.

Proceeding from the figures contained in the diagram, at "cruising" speeds dolphins have a laminar flow regime in the boundary layer. Since Reynolds numbers are fairly high at these speeds, with which a laminar boundary layer cannot be ensured on solids, we shall assume that dolphins have the ability to control the flow regime with the aid of certain mechanisms which have not yet been fully studied. Obviously the mechanism of laminarization of the boundary layer in dolphins is designed for "cruising" conditions of locomotion, in which they spend a large part of their time. This provision is the most natural, since it reflects the result of optimal adaptation of cetaceans to the conditions

of their environment in the process of a fairly long evolution. This principle of optimization consists in minimal expenditures of energy during locomotion throughout the entire life of a marine animal.

/Mathematical model of elastic-damping integument of cetaceans./ The assumption was made that cetaceans develop speed of locomotion not only by preventing premature transition of laminar to turbulent boundary layer, but also by reducing turbulent friction drag. A turbulent boundary layer on an elastic-damping surface, capable of partially or completely absorbing pulsating energy in the layer, was theoretically examined in connection with this [19-20].

We shall discuss below a model of a continuous elastic-damping surface, which in our opinion most satisfactorily describes the processes of absorption of turbulent pulsation energy in the boundary layer of cetaceans. The model of a different resonance elastic-damping surface is more in conformity with membrane surfaces found in nature among various flying insects. An equation of quantity of motion, an equation of turbulent energy balance in the vicinity of the boundary layer, and an equation of discontinuity were employed:

$$U \frac{\partial U}{\partial x_1} + V \frac{\partial v}{\partial x_2} = -\frac{1}{\rho} \frac{\partial p}{\partial x} + \nu \frac{\partial^2 U}{\partial x_2^2} - \frac{\partial}{\partial x_2} \langle U'_1 U'_2 \rangle, \quad (15)$$

$$U \frac{\partial b}{\partial x_1} + V \frac{\partial b}{\partial x_2} = -\langle u'_1 u'_2 \rangle \frac{\partial u}{\partial x_2} - \frac{\partial}{\partial x_2} \langle u'_2 \left(\frac{p}{\rho} + b' \right) \rangle + \nu \langle \frac{\partial U_i^2}{\partial x_j^2} \rangle, \quad (16)$$

$$\frac{\partial U}{\partial x_1} + \frac{\partial V}{\partial x_2} = 0, \quad (17)$$

where U , V and $u'_1 u'_2$ -- components of average and pulsation velocities along the x_1 and x_2 coordinates, p , p' -- pressure and pressure pulsation,

$b' = \frac{1}{2}(u_1'^2 + u_2'^2)$ -- pulsation of the kinetic energy of pulsation motion of a unit of mass, $\langle \rangle$ -- designation of time averaging.

The following additional hypotheses were adopted for closure of system of equations (15)-(17):

$$-\langle u'_1 u'_2 \rangle \frac{\tau}{\rho} = \epsilon_B \frac{\partial U}{\partial x_2}, \quad -\langle u'_2 \left(\frac{p'}{\rho} + b' \right) \rangle = \epsilon_A \frac{\partial b}{\partial x_2}, \quad \nu \langle \frac{\partial u_i'^2}{\partial x_j^2} \rangle = \frac{c}{l} b^{3/2}, \quad (18)$$

where ϵ_B -- kinematic coefficient of turbulent viscosity, ϵ_A -- turbulent diffusion coefficient, l -- characteristic length, c -- empirical constant.

The principal mechanism of the mathematical model of elastic-damping integument under consideration consists in the fact that the averaged flow of pulsation energy into this integument in a unit of time through a unit of area is taken as the difference between received and returned energies

$$\epsilon_A \frac{\partial b}{\partial x_2} = \frac{\epsilon_A}{L_1} (b - \bar{b})|_{x_2=\zeta}, \quad (19)$$

where L_1 -- characteristic length.

Figure 8 contains computed coefficients of local friction drag for a rigid [2] and elastic-damping surface with absorption coefficients equal to 0.23 (3) and 0.5 (4) respectively.

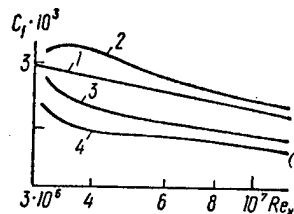


Figure 8. Relationship between coefficient of local friction drag for an elastic-damping plate simulating the skin of cetaceans and degree of absorption of pulsation energy and local Reynolds number.

Analysis of the results enables one to conclude that within the framework of the utilized hypotheses, any surface which absorbs pulsation energy of a turbulent boundary layer reduces turbulent friction drag. Thus within the framework of the examined model we have shown the fundamental possibility of reducing hydrodynamic drag with a completely turbulent flow regime through absorption of pulsation energy by the skin of cetaceans. For example, even with partial absorption of turbulent pulsation energy by a dolphin's skin (absorption coefficient equals 0.5), with a fairly high Reynolds number, close to 1×10^7 , decrease in hydrodynamic drag can reach approximately 35-40 percent. The well-known D. Grey hydrodynamic paradox, however, cannot be explained by the above mechanism.

/Self-adjustment of variable elastic-damping properties of the skin of cetaceans/ [21, 22]. V. Ye. Sokolov [4, 6] studied morphological peculiarities which suppress skin elasticity, ordering of the cellular structure of the epidermis, the shape of dermal papillae, and the direction of the dermal ridges along the body.

An important feature of the outer layers of the integument is the high degree of saturation of the entire thickness of the dermis with an extensive, sectioned network of small blood vessels, which fill with blood to a differing degree with an increase in speed of locomotion, which substantially changes the elastic-damping properties of the upper layers of skin. As a result of biohydrodynamic interaction between the skin, the field of perturbation velocities and water pressure by the boundary layer, the integument performs a unique hydrodynamic function of an active and regulated elastic-damping covering.

With an increase in cetacean locomotion speeds, the perturbing force effect of the boundary layer and reaction-response of the skin regulating organs penetrates deeper into the integument. In connection with this we must emphasize the high receptor sensitivity of the skin of cetaceans. Preconditions for this are connected with considerable innervation of the skin [23, 24], in which the nerve endings, as was shown by Professor G. B. Agarkov and his colleagues, penetrate through the dermal papillae and the epidermis close to the

outer surface, where various highly sensitive receptors have been discovered.

The noted morphological peculiarities of the structure of the skin of cetaceans are the reason for the existence of the phenomenon of self-adjustment of variable elastic-damping properties of cetaceans, which is confirmed by measurements of the degree of turbulence in the boundary layer of dolphins with the aid of remote hot-wire anemometer equipment. Analysis of the results of these investigations [22] indicated that distribution of degree of turbulence in the boundary layer of a dolphin differed qualitatively from corresponding values for rigid models of dolphins. The degree of turbulence in the boundary layer of the rear part of the model increases substantially with increased towing speed. At the same time the corresponding value decreases substantially in the dolphin, which swims actively, that is, optimization of the regulating effect of the skin takes place. Unquestionably all this proves active self-adjustment of variable elastic-damping properties in cetaceans for the purpose of adjusting flow regime in the boundary layer, which leads to local decrease in speed pulsations and integral hydrodynamic drag.

/Controlled hydroelastic effect of the tail flukes of cetaceans/ [25]. We shall note that the discussed hydroelastic effect differs qualitatively from the phenomenon of self-adjustment of the elastic-damping properties of cetaceans examined above. This controlled effect is first and foremost dependent upon the specific morphological structure of the tail flukes of cetaceans. All control surfaces take part in the locomotion of these creatures: the tail fluke -- the principal sweeping propulsion mechanism, which produces propulsive thrust and overcomes hydrodynamic drag; vertical dorsal fin -- a passive vertical stabilizer during locomotion; flippers -- active control surfaces for vertical and horizontal maneuvers. All of them, independent of their functional designation, constitute small aspect ratio hydrofoils.

Observations indicated that the elasticity of the tissues of the tail fluke is highly variable -- varying from a relaxed state during rest on the water surface to clearly elevated elasticity, such as during leaps into the air to a height of up to 2-3 meters. The tissues of the tail fluke of dolphins consist of five layers: epidermis, papillar tissue, tendinous tissue, reticular dermis, and hypodermal formations, which comprise the heart of the tail fluke. The noted features of the structure of tail fluke tissues indicate that the fluke proper does not have a rigid supporting skeleton. Tail flukes contain in the hypodermis and reticular layer of the dermis directionally oriented and densely packed connective-tissue formations (collagen bundles), which increase tissue elasticity. This elasticity, however, can be regulated by a special function of an extensive network of blood vessels which are positioned among the tissue supporting elements. In all these instances of locomotion, the phenomenon of self-adjustment of elasticity of cetacean tail flukes and flippers occurs in reflex fashion with a change in locomotion regime. It is caused by action of organs of the blood-carrying system -- discovered extensive complex arterio-venous vessels, systems of capillaries and anastomoses of various type, as well as by the structure of the integumental tissues of flukes and flippers, which include a covering of tendons.

The examined biological models of self-adjustment of variable elastic-damping properties of skin and the hydroelastic effect of the tail flukes of cetaceans are fully in conformity with the principle of Academician I. P. Pavlov on dynamic adequacy during interaction between a biological system and the external environment, which we formulate as follows: with a change in complexity and environment, a biological system always seeks to attain a new level of adequacy in complexity and organization with an average minimization of time and expenditures of matter and energy. In the specific instance under discussion the biological system is the cetaceans, and the environment is the water medium in which they live. At the same time the principle of minimization of energy expenditures is realized by achieving minimal energy expenditures on locomotion due to the formulated phenomena of self-adjustment of skin and the hydroelastic effect of the tail flukes of cetaceans. In the case of dynamic adequacy, they should be viewed as a follow-up system.

We shall note that mathematical and hydrodynamic models of the locomotion of cetaceans -- dolphins and whales -- have now been formulated, models which enable us with sufficient accuracy to describe quantitatively the complex hydrodynamic process which takes place during cetacean locomotion through the water.

Various mathematical models, which are grounded on independent principles (an ideal and viscous liquid, a bioenergetic approach), provide surprisingly accurate quantitative results and are in good agreement with the data of field observations.

Close scientific collaboration between biologists and hydrodynamicists, who fruitfully supplement one another, is a guarantee of further successful development of biological hydrodynamics. On the one hand, knowledge of hydrodynamic principles and mechanisms will help biologists correctly analyze and better understand the mechanism of functioning of biological structures in the process of their study. On the other hand, investigation of the functioning of natural analogues will enable hydrodynamicists to stimulate the development of new engineering solutions, which will ensure technical effectiveness as they more closely approach natural structures.

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MEDICINE

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HIGH LEVEL TASKS

Moscow KHIRURGIYA in Russian No 2, Feb 84

[Foreword from the journal "Khirurgiya"]

[Text] The June (1983) Plenum of the CPSU Central Committee occupies a central place among many important recent events in the life of our Party and people. The Plenum of the CPSU Central Committee examined one of the major directions in the activity of the Party, one of the most important elements of the communist structure--ideological, mass-political work. The CPSU is proceeding from the fact that the formation of the new person is not only the most important goal, but also an indispensable condition of the successful building of communism.

The Plenum analyzed thoroughly, with Leninist principles, the state of affairs in ideological work and summed up the realization of resolutions of the 26th Party Congress and the fulfillment of the CPSU Central Committee's April 26, 1979 decision. "The future improvement of ideological and political-educational work" and determined basic directions and tasks of propagandistic, educational work in its contemporary stage and for the forthcoming period.

However, aims of the CPSU Central Committee Plenum go far beyond limits of the purely ideological, educational sphere; they give a new impulse to the economic and social development of our country. Communists and the entire Soviet people, carefully reading the Plenum documents, will again be convinced that the Leninist Party is concerned foremost with the Soviet citizen, his material welfare and spiritual development and with guaranteeing him a peaceful life.

A great contribution to the theory and practice of the socialist structure was the speech given at the Plenum by comrade Yu. V. Andropov, General Secretary of the CPSU Central Committee. It conveys a profound understanding of present internal and external conditions and impresses one with its innovative approach to complex problems of the present day and to realistic attitudes in the evaluation of the state of affairs in various fields of governmental and social life. This document clearly designates basic directions in which actions of Party committees, means of mass information and propaganda and all ideological institutions and cadres should be concentrated.

Yu. V. Andropov's speech stresses that the new wording of the CPSU Program, which is being prepared for the resolution of the 26th CPSU Congress, is intended to be exceptionally important for ideological, and, in general, all work of the Party. The new wording of the CPSU Program will give a realistic analysis of the existing situation and clear guide lines for the future which, coordinate life experience with the final goals of our Party. The Party Program in modern conditions must first of all be a program of systematic and all-round perfection of developed socialism and further advancement to communism.

In connection with this, special attention in Yu. V. Andropov's presentation at the Plenum was given to the necessity of fully realizing the character of the stage of social development that we are now experiencing. As Yu. V. Andropov stressed, Soviet society has arrived at a certain historical boundary in its history, when major qualitative changes in productive strength and the accompanying improvement of production relations have not only ripened, but have become inevitable. It follows that certain changes are necessary not only in the sphere of economics, but also in the area of consciousness and the building of society as a whole. And here, the question of the role of social sciences stands out with special clarity. The Party and government await a worthy contribution from social scientists to the solution of the far-reaching problems posed at the Plenum.

As is known, workers are the main productive force. It is for precisely this reason that the Secretary General of the CPSU Central Committee noted in his presentation that problems of health care will be occupying a more important place in social politics of the Party. Special attention of medical scientist and workers in practical health care is directed to the need for preventing diseases, and, as one of the methods for this, the introduction of a yearly system for prophylactic dispensarization for the entire population. Concern for the health of our people, a very important matter in the social as well as the economic plan, is the major task of Soviet health care workers, which the Party and Government are placing before them.

Materials of the Party Central Committee Plenum provide the established nature of the place and role of political and educational work in all CPSU activity and its main trends. Demands have been formulated in them at the present for ideological work. In the most concentrated form, they amount to the following.

It is necessary to decisively raise all ideological-education and political work to the level of complex tasks which the Party solves in the process of perfecting developed socialism. A scientific nature, truthfulness, realism and efficiency are all inherent traits of communist propaganda. It is necessary to subordinate all of our ideological, mass-political work to requirements of the practice of building communism.

The Party has a very rich arsenal of methods for enlightenment and education. The present level of education and questions of Soviet people also makes increased demands on the nature of employing these methods. We must wage a relentless war against formalism, cliché, stagnation and sensationalism.

It is necessary to guarantee a higher level of ideological and theoretical activity, which nourishes propaganda with new conclusions and situations, to change the work style of the political educational system and to make sure that every Soviet person more completely understands Party politics, knows how to practically apply received knowledge, with honor, and, in fact, to fulfill his or her civic duty.

The modern stage is characterized by the fierce antagonism of two opposite ideologies, two political courses--socialism and imperialism. Here passes the front of the struggle for the minds and hearts of billions of people, the outcome upon which future mankind, to a great extent, depends. From here are two interrelated tasks: efficient, effective propaganda of the truth about socialism, Soviet society and the peaceful foreign policy of the CPSU and the relentless exposure of the lies and slander of imperialism and its propagandistic diversions. Our propaganda must be militant and offensive, and an effective, dynamic single system of counter-propaganda is needed. Active rebuff of anti-communism and anti-Soviet thinking is the most important and permanent direction of the action of Party committees.

It is clear that ideological work of the Party is objectively moving ever closer to the foreground. This is explained by the fact that the people, the working masses, are the decisive force of communist social progress. The degree of consciousness of the masses is directly and immediately revealed in the rate of our social and economic development. For precisely this reason, ideological work must not only be a matter for professionals--ideologists, propagandists and workers of means of mass information. It is an affair of the entire Party.

Each Party committee and every Party organization is called upon every day to persistently foster devotion in workers to the great ideals of communism, patriotism and internationalism, a conscientious relationship to work and to their obligations, high moral qualities and irreconcilability to infringements of norms of socialist society and to bourgeois ideology and morals.

The Party attaches great importance to the direct participation of communist leaders in this work. Who, if not they, must answer questions worrying people and know better and more precisely the mood of the masses, their questions and needs. After all, the formation of the new person is affected not only by means of ideological influences, but also by the reality of everyday life in industry and in the sphere of social and political activity and cultural and welfare facilities.

The complexity and scale of tasks for the development of consciousness in all citizens of our society require that every communist take direct part in this effort. In the very midst of the masses, continually interacting with people, the communist interprets the inner and outer politics of our Party and the immediate tasks of economic and cultural development and, when necessary, rebukes erroneous judgements and unhealthy attitudes. He convinces people with the living Party Word and with his personal example, he leads them and forms a social outlook. "There is no duty more honorable for communists," stressed the CPSU Central Committee Plenum, "than to carry the great ideas of Marxism-Leninism to the masses, reveal the indissoluble connection between Party politics and vital interests of the people and to raise social activity of workers even higher."

Proceeding from Lenin's position that "All propaganda must be built on the political experience of economic construction" (Complete works, Vol 41, p 407), the 26th CPSU Congress formulated a conclusion of particular importance: educational success is guaranteed only when it rests on the solid foundation of social and economic politics. This obliges all participants in this noble business of education to attain close coordination of ideological and educational work with the struggle to fulfill key national economical and social-political tasks.

Among these are, first of all: further advancement along the path of intensive development and, directly connected with this, a fundamental task--a major increase of work productivity on the basis of combining on the job advantages of socialist structure with achievements of the NTR [expansion unknown]; the necessity of overcoming essential differences between physical and mental labor, which requires, at today's stage, first of all, a major reduction in the usage of manual, poorly qualified labor; the rapprochement, and, in the future, the merging of two forms of property--State and cooperative-kolkhoz, into single, public property, which greatly depends on the successful resolution of the problem of agricultural industrial integration, etc. The solution to these and several other problems will provide a notable advancement toward social homogeneity of our society. The formation of its classless structure mainly is occurring already in the stage of matured socialism.

Taking on future tasks, Soviet people must know how to energetically start solving primary question, in a business-like manner. The most important of them is the unconditional fulfillment of the yearly target and the 11th Five-Year Plan in its entirety, including tasks placed before medical science and practical health care. It was noted at the Plenum that the democratic nature of our system of free health care, which is the first in the world, is well known. However, its qualitative level still far-from-always meets the demands of developed socialism, which was indicated several times in recent years in Party resolutions. In order to resolve these problems, great efforts of each medical worker are needed. It is the duty of Party organizations of communists, using all means of ideological and educational and organizational work at their disposal, to mobilize workers to the realization of target plans and to increase production and social activity of every worker, no matter in which sector he is employed. That means everyone! Such is the requirement of our times.

It would be wrong to consider implementing achievements in science and energy, wise economics of raw material, energy, capital investments, labor resources and tightening discipline and order in production only as an economic, domestic affair. The progress of these questions, as well as the solution to political problems, is inconceivable without the constant cultural growth of people and the development of their social activity. At the same time, steady advancement in economics and in rational labor organization fosters further development of active, creative beginnings for people and morally uplifts them. We shall present just a few examples: complex automation costs are a function, primarily, of the yield of the invested ruble; the use of 10 ton of metal powder (powder metallurgy) makes it possible to spare 3-4 tons of metal and approximately 150 pairs of workers' hands; 1 ton of

plastic helps to save 3 tons of metal in motor vehicle construction; as for increase of expenditure on obtaining raw material, economics of energy resources costs 2-3 times less today than their extraction; consumption of electric energy above the established norm of approximately 3.1 billion kwt/hr today reduces work of the Yakutsk AES to nothing; actual losses in industry and construction (due to truancy, tardiness and losses within shifts) are equivalent to the same as if 1 million people did not work everyday; the yearly leftovers of bread to a family amounts to approximately 27.4 kg and only 1/5 of the families use it, while the rest throw it out; if every one of us discards only 20 g of bread yearly, it amount to 1.5 million tons of grain a year. It is not always possible to precisely consider moral gain and moral losses from a similar type of phenomena, but they are incomparably higher than economic indicators.

Life makes ever greater demands on the Soviet person--on his general education and occupational preparation, economic thinking, political sophistication and moral consciousness. The Central Committee Plenum noted that the new person is not only a distant ideal, but also a reality of our times. However, his education is an constant and complex as is life itself, as is the labor process itself. In precisely this process, in the struggle for the manifestation of fundamental principles of socialism and social development and in surmounting stagnation, bureaucratism, seniority and departmental bureaucracy, excellent civic qualities of the socialist worker are forming and developing first of all, and the necessity of honest labor for the good of society and a feeling of collectivism are fostered. It is noteworthy that participants in the national discussion of the Law project on labor collectives stressed the great possibilities of labor collectives as an educator, particularly in their moral effect on those who hinder people from living a socialist life. Here, problems of eradicating drunkenness, hooliganism, money-grubbing, misappropriation of national property, bribery and other antipodes of communist morality are raised especially critically. Workers have qualified these phenomena as social evil, intolerable in our society. In order to successfully ward off this evil, it is necessary to know its causes and roots. It was pointed out at the Plenum that all types of "defects" exist on every soil. There have been miscalculations of these or other workers, actual problems and difficulties of our development, deficiencies of educational work and the inability to fully utilize our democratic norms. Our physicians' work is surrounded with worry and attention, and "latent" (hidden, screened) relations between physician and patient, which arise here and there, become all the more intolerable. Medical workers who allow amoral behavior, are few; but such people, remaining unpunished, cast a shadow on the voluminous army of Soviet physicians who honorably and conscientiously preserve the health of Soviet people. Unfortunately, obvious crimes do occur about which one may read in the press from time to time.

In the struggle against negative occurrences, it is very important to correctly combine varied measures of economic, educational, organizational and legal order. Party organizations must rely on the power of social opinion and on the influence of the labor collective, and guarantee a leading role for communists. Members of Lenin's Party are called upon, with their labor and moral example, their cooperation and organization, to serve as a model for

all workers of any labor collective, to be irreconcilable to laxity and self-seeking behavior, to manifestations of private-owner psychology, to a consumer's attitude toward life and to the attempt to take a little more from society and give it a little less. Their duty is to be active organizers of the struggle against negative phenomena, pioneers in the creation of an atmosphere of intolerance in relation to robbers and money-grubbers, idlers and shirkers. Their important task is to educate and develop in people, especially in the youth, devotion to principles of communist morality, respect and aspiration to honest, conscientious work for the good of the Socialist Motherland. A more persistent and purposeful effort at the formation of reasonable necessities and judicious personal interests is necessary. It is necessary to more skilfully carry out deontological education of such a specific category of youth as student medical workers.

The June (1983) Plenum of the CPSU Central Committee advanced the development of a well-conceived single system of counter-propaganda as one of its primary tasks. This is a difficult task. Soviet medical workers must not shirk resolution of this important task.*

When speaking of the contribution which ideological work of the Party is called to make to the social-economic and spiritual development of our society, we must not, to any extent, forget about questions of foreign policy.

The range of effects in all facets of ideological-educational and mass-political work is varied. Tasks are complex and goals are noble in this activity. There is a lot of work to do. It is necessary to undertake this work without procrastinating, mobilizing the spiritual energy of Soviet people and directing it to resolving key tasks before the Party and people.

*The West is known to love to extol the advantages of cost health care, but the truth is hidden in that such treatment is practically unattainable for many. For example, the continuing rise of inflation in the USA is irrepressibly moving above and beyond the astronomical cost of treatment and medicines. The cost of medical services for each person amounted to, on the average, 322 dollars in 1981 (excluding insurance), and it is predicted that in 1985 it will reach 550 and in 1990--791 dollars. Here is the cost for some medical services: consultation with an internist--approximately 82 dollars, consultation with a dentist--approximately 55 dollars, medicine--approximately 75 dollars, glasses--approximately 20 dollars and medical care--approximately 20 dollars. More than 17 out of every 100 operations in the USA are conducted for commercial aims. More than 3 million unnecessary operations give physicians a profit of approximately 5 billion dollars a year. The American journal "New Times" leaked facts about the system existing in that country of physicians selling their patients to owners of private hospitals. They were sold at the statutory price of from 50 to 100 dollars "a head", depending on the diagnosis. At another statutory price, the physician, having convinced the patient to go into the hospital, receives 10% of the sum which the patient

pays the hospital. One of the administrators of a private hospital announced, "If we have bought a patient, we won't release him, no matter how he fusses, until he has accrued a bill of at least 1,000 dollars. But even after that, we will be finding newer and newer defects in him. Our goal is to shake no less than 3,000 dollars out of him."

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DISTINCTIONS OF ISCHEMIC HEART DISEASE IN ALCOHOLICS

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[Article by B. B. Bondarenko and S. P. Yeroshin, Department of Psychiatry (headed by Prof B. A. Lebedev) of the First Leningrad Medical Institute imeni I. P. Pavlov and Leningrad Scientific Research Institute of Cardiology (director Prof V. A. Almazov, corresponding member of the USSR Academy of Medical Sciences), RSFSR Ministry of Health]

[Text] In recent years, the course and prognosis of various forms of ischemic heart disease (IHD) in patients who suffer from alcohol abuse have become the subject of intensive investigation. A number of authors believe that there are no specific features to the course of IHD against the background of alcoholism. In the opinion of others, IHD in alcoholics often presents a latent course, and they could even develop acute myocardial infarction without a pain syndrome, which is attributable to the analgesic and anesthetic effect of alcohol (A. M. Skupnik; V. N. Dzyak et al., Viel et al., and others). The question of the role of alcohol in development of IHD is debatable. Along with the conception of higher incidence of IHD among alcoholics, as compared to the general population, the opposite opinion also exists. Most authors arrived at the conclusion, which was based on epidemiological studies, that alcohol does not play an appreciable role in development of IHD. Stason et al. and others report that the incidence of IHD is lower among alcoholics than the general population. Apparently, such contradictory estimates can be attributed in part to the fact that different criteria were used in patient screening; this, in turn, raises a question as to homogeneity of the examined groups, if only with regard to amount of alcohol consumed (Dyer et al.).

In this study, to define the distinctions of the combined course of alcoholism and IHD, we used strict criteria for diagnosing both diseases. The diagnosis of alcoholism was based on demonstration of mental and physical dependence on alcohol, the alcoholic abstinence syndrome (AAS), loss of quantitative control, changes in form of inebriation, alcohol tolerance and the patient's personality (A. A. Portnov and I. N. Pyatnitskaya). For diagnosing IHD, we used the standard questionnaire of Rose (Rose and Blackburn) for establishment of clinical history. The patients were submitted to an electrocardiographic examination; Master's test was used in diagnostically unclear cases. We took dynamic EKG's and performed the pharmacological test with nitroglycerin for the purpose of differential diagnosis of IHD and alcoholic cardiomyopathy. This study was pursued in specialized departments of psychiatric hospitals.

At the first stage, we examined all patients hospitalized for a total of 160 days with the diagnosis of "chronic alcoholism" (readmissions were not included). In all, we examined 764 patients (648 males and 116 females); IHD was found in 32 men (4.8%) and 5 women (4.3%). In 14 of them, the diagnosis of IHD was made for the first time, although 10 patients had been hospitalized previously in psychiatric hospitals. Retrospective analysis revealed that in the preceding hospitalizations they also presented clinical signs of IHD.

In addition, one-third of the patients (229 men and 42 women, 36.3% and 36.2% of all patients, respectively), there was a cardialgic syndrome without signs of IHD. In these cases, pain usually appeared in the cardiac region in the sobering up period; it persisted for a long time (30 min or more) and was never localized beyond the sternum. Unlike angina, it was not in the nature of attacks and unrelated to physical loads. Nitroglycerin was ineffective, whereas intake of even a small amount of alcohol curbed or alleviated the pain. The pain was toggling, dull or stabbing. Electrocardiography failed to reveal any changes typical of IHD in any of these patients. According to existing conceptions, alcoholic cardiomyopathy was diagnosed in them (Ye. N. Artem'yev et al.; K. Yu. Yuldashev and M. Ya. Kuklinskiy; I. N. Pyatnitskaya et al.; V. N. Dzyak et al.). At the second stage of our work, we analyzed the course of IHD in 75 patients with stage II alcoholism (70 men and 5 women). The absence of cases with stage I alcoholism is attributable to the fact that they are not hospitalized in psychiatric hospitals, whereas those with stage III were not included in our processing due to the significant difficulties of clinical history taking. The patients ranged in age from 27 to 66 years (57.3% were in the range of 30-50 years). In 63 cases (84%), there was a hereditary burden of cardiovascular diseases in immediate family, and in 21 of these cases (28%) a member of the immediate family had suffered myocardial infarction. In all patients, the attacks of angina were typical: pain localized beyond the sternum in 29 cases (38.7%), in left half of the chest in 45 (60%) and epigastric region in 1 case. In 53 cases (70.7%) the angina attacks occurred no more than 2-4 times a month, usually after considerable physical exercise during periods of abstaining from alcohol or moderate intake of alcohol. As a rule, there were no attacks during periods of heavy drinking. During AAS, most patients (68 out of 75) had angina attacks again and they became more frequent, up to several times a day, lasted longer and were more intensive. Previously, such a pattern had been observed by O. I. Glazova and V. V. Novosel'skaya. In 65.3% of the patients, the angina attacks occurred against the background of prolonged dull, tugging or stabbing pain inherent in alcoholic myocardiopathy. Persistent aching pain in the cardiac region appeared during periods of a hangover in 3 out of 7 patients, in whom angina attacks did not occur more often during AAS. Such a course of IHD, as well as the typical personality changes inherent in alcoholics, were apparently the reason for anosognosia noted in most studied patients, with regard to not only alcoholism, but IHD. First of all, this was typical of patients with personality changes of the alcoholic type (light-mindedness, carefree attitude, mendaciousness) and of the alcohol-organic type (with worsening of memory, intellect, diminished validity of thinking). Such patients, even if IHD was diagnosed, including acute myocardial infarction, often believe that the physicians are wrong, arguing that they are not disturbed with pain when drinking heavily and that it goes away after intake of alcohol. "Real" pain, in their opinion, appears usually during hangovers (AAS). When questioned, these patients usually do not report the occasional, brief and

mild pain that appeared with physical exercise or when going from a warm room out in the cold during periods of abstinence or moderate alcohol intake. Thus, it is difficult to make the diagnosis of IHD in many alcoholics on the basis of ordinary examination of their history. It is simpler to make the correct diagnosis when there is active demonstration of typical IHD symptoms, when essentially the same question is posed in different versions at intervals, which rules out set responses. For example, "Did you ever have any unusual sensations when climbing steps, going out of a warm room into the cold, climbing a mountain, performing heavy physical labor," etc. The time intervals between these questions are spent studying the history.

The foregoing can be illustrated with the following clinical cases:

Patient K., 27 years, has been drinking for 10 years and daily for the last 2 years, AAS was formed, control lost, amnestic forms of intoxication, increased alcohol tolerance. Came to an internist only in connection with "colds." He was hospitalized in the psychiatric hospital because of AAS. In examining his history, he denied any pain in the region of the heart or retrosternally, but since his EKG showed signs of coronary insufficiency, the specificity of which was confirmed by the results of Master's test, in a more purposeful conversation it was possible to elicit that the patient periodically experienced the sensation "as if someone placed his hand on the heart." Such sensations occurred seldom, usually after considerable physical exertion, they lasted "only 2-3 min," and he paid no attention to them.

Patient P., 48 years old, with an analogous alcoholic history, also denied at first that there had been any painful sensations retrosternally or in the cardiac region, although a comprehensive questioning revealed that pressure pain appeared retrosternally, extending over the entire chest, for the last 2 years, 2-3 times a month, after heavy physical exertion. He assessed such sensations as being related to a "cold." These sensations occurred more often, every 1.5-2 h, 12 days prior to admission in the psychiatric hospital. This time, the patient also related them to a "cold." On the following day, because of temperature elevation to 37.8°C, he went to a physician who evaluated his condition as "acute respiratory" disease, failing to consider the patient's alcoholic history. Since the attacks of pain recurred, the patient started to consume large amounts of alcoholic beverages to "remove the pain" (prior to this he had been in alcoholic remission for 7 months), after which the pain went away. He was hospitalized 12 days after onset of the pain in the psychiatric hospital, presenting signs of AAS. His EKG showed extensive transmural myocardial infarction in the subacute stage.

Only one-fourth of the patients had an adequate attitude toward IHD during periods of abstinence from alcohol or remission. They were characterized by personality changes of the asthenoneurotic type in the form of irritability and asthenia. During such periods, the patients not only had an adequate attitude toward IHD, but they also presented elements of a critical attitude toward alcoholism.

During periods of abstinence from alcohol or heavy drinking, the angina attacks in the patients we studied were very seldom associated with anxiety or fear; but during the AAS periods the attacks of pain were associated in all cases with marked anxiety and prolonged excitement, irritability and impulsive attraction to alcohol.

Of the 75 patients, 21 (28%) sustained acute myocardial infarction; their age ranged from 28 to 56 (30-50 years in 14 cases). In 13 cases, myocardial infarction was not associated with a lengthy pain syndrome, but was manifested by more frequent attacks of tension angina. Yet, according to V. I. Metelitsa and N. A. Mazur, such an onset of acute myocardial infarction is encountered in the general population in only 2.6% of the cases. This difference cannot be attributed solely to the analgesic and anesthetic effect of alcohol, since only 3 out of these 13 patients developed myocardial infarction while intoxicated, whereas in 4 cases it occurred against the background of AAS and in 6, abstinence from alcohol for 5 or more days. Apparently, such atypical manifestation of acute myocardial infarction, as well as the patients' underestimation of existing cardiac pathology, can be attributed also to the fact that only 1 out of the 13 patients was hospitalized promptly, whereas in the other cases the correct diagnosis had been made at least 4 days after onset of myocardial infarction. As it was stressed above, the thorough work-up of patients suffering from alcoholism established IHD for the first time in over one-third of the cases. Yet correct and prompt detection of IHD is of substantial significance to settling the question of choice of therapy for alcoholism. Interrogation of the patients established that some of them, in spite of presence of clinical manifestations of IHD, had previously undergone active therapy for alcoholism, against the background of which aggravation of IHD had been observed. Thus, in 11 (36.7%) out of 30 patients given tetruram, there were more frequent angina attacks during intake of this drug, while apomorphine had to be rejected in 6 out of 10 cases due to onset of prolonged angina attacks, which were associated in 2 cases with collapse, 10-15 min after injecting this agent. One patient was treated with lamb succory decoction and, after the 4th treatment, he developed acute myocardial infarction with cardiogenic shock. Such complications could have been avoided with prompt detection of IHD, since the above-mentioned drugs are contraindicated when alcoholism is combined with IHD (E. A. Babayan and M. Kh. Gonopol'skiy; G. Ye. Rudenskaya et al.).

Conclusion

Among patients suffering from alcoholism and admitted to psychiatric hospitals, IHD is diagnosed according to strict criteria in 5% of the cases. The history about IHD in alcoholic patients is often unreliable (in particular because of anosognosia), and this must be taken into consideration in diagnosing IHD, which should be based on active demonstration of symptoms inherent in IHD, including its discrete forms. When alcoholism is combined with IHD, the lowest incidence of angina attacks is referable to periods of intoxication and the highest, to AAS periods, which makes even more difficult differential diagnosis between IHD and alcoholic myocardiopathy; the latter must also be taken into consideration when selecting adequate therapy for patients in AAS. It is often difficult to diagnose myocardial infarction in alcoholics because it is often not associated with the typical pain syndrome, and is manifested only by increased frequency

of angina attacks. Administration of teturam, apomorphine and their analogues aggravates the course of coronary insufficiency, and it is contraindicated when alcoholism is combined with IHD.

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CSO: 1840/1037

UDC 615.47.012:008(47+57)

PRODUCTION OF MEDICAL TECHNOLOGICAL EQUIPMENT DURING FOURTH YEAR OF ELEVENTH FIVE-YEAR PLAN

Moscow MEDITSINSKAYA TEKHNIKA in Russian No 6, Nov-Dec 83 pp 3-5

NEUGODOV, P. P., Director of Production Administration, Ministry of Medical Industry

[Abstract] One of the more important problems facing the Ministry of Medical Industry is the optimal response to the continuously increasing demands of public health in the area of technical support. Annual growth of medical technology during the eleventh Five-Year Plan is about 7-8%, somewhat above the average of national economy. The transition to annual examination of the population placed additional requirements on medical industry in terms of the delivery of new equipment. Already, at first steps of this program, the requirement for automated equipment is obvious. The production increase must be achieved through technological reorganization. A number of proposed projects are reviewed aimed principally at development of cardio-pulmonary equipment. New surgical instruments are projected as well as ophthalmologic instrumentation.

[470-7813]

MICROBIOLOGY

ALLOMONADES - NEW GROUP OF VIBRIONACEAE FAMILY MICROORGANISMS

Prague ZHURNAL GIGIYENY EPIDEMIOLOGII MIKROBIOLOGII I IMMUNOLOGII in Russian
Vol 27, No 3, 1983 (manuscript received 18 May 82) pp 271-279

KALINA, G. P., SOMOVA, A. G., NIKONOVA, V. A., TUROVA, T. P., GRAFOVA, T. I.,
PODOSINNIKOVA, L. S., LAPENKOV, M. I. and BADALOVA, I. M., Moscow Institute of
Hygiene imeni F. F. Erisman, Rostov-na-Donu Anti plague Institute, Institute of
Standardization and Control of Medical Biological Preparations imeni L. A.
Tarasevich, Moscow State University imeni M. V. Lomonosov, II Moscow Medical
Institute

[Abstract] During evaluation of the applicability of the A-2' medium in
separating acromonades, which develop on this medium, from vibrios which do
not, a new group of microorganisms was identified. After thorough taxonomic
investigation which included evaluation of phenotypic properties, statistical
treatment of the results obtained, determination of phenotypic similarities
according to Adanson-Sneath and study of the DNA composition and of the level
of DNA hybridization, this group was identified as *Allomonas enterica* sp. nov.
from the family Vibrionaceae. Figure 1; references 23: 6 Russian, 17 Western.
[536-7813

NONIONIZING ELECTROMAGNETIC RADIATION EFFECTS

UDC 612.438.014.2-06:615.846

EFFECT OF DECIMETER WAVES ON PHYSICAL-CHEMICAL STATE OF MEMBRANES, THYMOCYTE CHROMATIN AND IMMUNOLOGICAL REACTIVITY OF AN ORGANISM

Moscow VOPROSY KURORTOLOGII, FIZIOTERAPII I LECHEBNOY FIZICHESKOY KUL'TURY in Russian No 2, Mar-Apr 83 (manuscript received 7 Jan 83) pp 6-10

SOKOLOVA, Z. A., ZUBIKOVA, S. M., FRENKEL', I. D., PERSHIN, S. B. and BOGOLYUBOV, V. M., Central Scientific Research Institute of Health Resort Science and Physiotherapy, Moscow

[Abstract] The effect of decimeter waves (DMW) on the functions of thymus and on proliferative processes in the lymphatic tissue of rabbits was studied. The DMW were aimed at the adrenal glands projection zones, thyroid gland and temple-parietal area. Possible changes in the endocrinological states and affiliated effects of the immunoreactivity were considered. The experiments showed that, depending on the localization of DMW, certain changes occurred in the structural-functional state of membranes and nuclear chromatin of thymocytes; this phenomenon was connected with the dynamics of immunogenetic processes. DMW's which stimulate or depress the functions of thymus may be used as inducers of suppression or stimulation of immunologic reactivity of an organism. References 14: 5 Russian, 9 Western. [463-7813]

UDC 615.847.112+612.43/45

CHANGE IN SPECTRUM OF BLOOD HORMONES UNDER INFLUENCE OF CENTIMETER RANGE MICROWAVES

Moscow VOPROSY KURORTOLOGII, FIZIOTERAPII I LECHEBNOY FIZICHESKOY KUL'TURY in Russian No 2, Mar-Apr 83 (manuscript received 24 Jan 83) pp 11-13

NIKOLAYEVA, L. A. and ULASHCHIK, V. S., Belorussian Institute of Continued Education of Physicians, Minsk

[Abstract] The goal of the present study was to evaluate experimentally the effect of centimeter range microwaves (CMW) on the functions of hypophysis, adrenals, thyroid and pancreatic glands. The experiments were done on chinchilla rabbits, exposing them to a single and repeated courses of CMW for 20 min at intensities of 50, 90 and 170 mW/cm². The following determinations

were performed in plasma: ACTH, somatotropic hormone, cortisol, thyroxin, triiodothyrocin and insulin. A single exposure to 50 and 90 mW/cm² dose led to the largest increases in secretion of various glands. High doses appeared to depress the secretory function. Hypophysis and adrenal hormones were affected more than any other hormones. Serial application of CMW led to decreased productivity of endocrine glands. References 7: Russian.
[463-7813]

UDC 616-006-092.9-02:615.846.015.4

EFFECT OF ULTRA-HIGH FREQUENCY ELECTRIC FIELD ON GROWTH OF TRANSPLANTED TUMORS IN MICE

Moscow VOPROSY KURORTOLOGII, FIZIOTERAPII I LECHEBNOY FIZICHESKOY KUL'TURY
in Russian No 2, Mar-Apr 83 (manuscript received 25 May 82) pp 56-57

PANIN, M. G., MAN'KO, Yu. K., KUDINOVA, V. F. and PORADOVSKAYA, T. P., Moscow
Medical Stomatological Institute imeni N. A. Semashko

[Abstract] Exposure of test animals (randomly bred and CBA or C₅₇BI strains males and females) to a short course of an electric field of ultra high frequency (10 and 20 sec) had no effect on the growth of their transplanted tumors (Sarcoma-180 and RShM-2). Eight exposures of 20 sec each of animals carrying leucosis La tumor led to a one day decrease in survival. The difference of these results with those obtained by V. F. Lopatin is ascribed to a much longer exposure time in Lopatin's experiments (15 min to 2 hrs per day), which resulted in local hyperthermia. References 6: Russian.
[463-7813]

UDC 595.7:591.1

PHYSIOLOGICALLY ACTIVE SUBSTANCES AFFECTING HORMONAL BALANCE IN INSECTS

Moscow ZHURNAL OBSHCHEY BIOLOGII in Russian Vol 45, No 1, Jan-Feb 84
(manuscript received 25 Nov 82) pp 36-48

POLIVANOVA, Ye. N., Institute of Evolutionary Morphology and Ecology of Animals
imeni A. N. Severtsov, USSR Academy of Sciences, Moscow

[Abstract] Between 1/4 and 1/3 of every harvest is lost to insects and various diseases, even though the use of pesticides increases continuously. The disadvantages of pesticide use include environmental pollution, evolution of pesticide-resistant lines of insects and destruction of needed insects. In search for new effective ways of protecting plants, the workers have turned to biological agents, among them various endocrinological factors: analogues of juvenile hormones, inhibitors of chitin synthesis, precocenes, etc. In attacking the principal morphogenic hormones, these agents upset embryonic and post-embryonic development, suppress reproduction and alter the behavior of insects. Compounds with highly specific action can be synthesized attacking only specific pests but being harmless to the useful insects like pollinators, entomophages, etc. With some of them (precocenes) there is a problem of stability which needs to be solved. A cautionary note is made that a lot of laboratory work must precede field applications so that selectively-acting hormone regulators could be obtained for each agrocenosis. Figures 3; references 67: 24 Russian, 43 Western.
[554-7813]

UDC 615.313.7:582.635.38].015.4:612.822.3

EFFECT OF Δ -9 TETRAHYDROCANABINOL ON EVOKED POTENTIALS OF CEREBRAL CORTEX

Moscow FARMAKOLOGIYA I TOKSIKOLOGIYA in Russian Vol 47, No 1, Jan-Feb 84
(manuscript received 1 Mar 83) pp 17-20

MACHULA, A. I. and BARKOV, N. K., All-Union Scientific Research Institute of General and Forensic Psychiatry imeni V. P. Serbskiy, Moscow

[Abstract] Effect of Δ -9tetrahydrocannabinol (THC) on the response to conditioned stimuli of cerebral cortex in the representation zone of conditioned and absolute stimuli and in the associative zone was studied on cats. It was shown

that at high doses (3.5 mg/kg) Δ^9 THC affected the early components of the evoked potential (EP) reflecting the reactions of the neocortex toward the exogenous signal as well as the late components representing the processing of the information received in the brain, aligning it with a response retained in the brain and organizing the response movement. In small doses (1.5 mg/kg) Δ^9 THC diminished the amplitude of primary responses. Figure 1; references 14: 6 Russian (2 by Western authors), 8 Western.
[541-7813]

UDC 615.21.3.065+615.9].015.4(048.8)

PREDICTION OF XENOBIOTIC ACTION ON MAN

Moscow FARMAKOLOGIYA I TOKSIKOLOGIYA in Russian Vol 47, No 1, Jan-Feb 84
pp 110-114

RYBOLOBLEV, Yu. R., Laboratory of Biologically-Active Emulsions and Lyophilization of Biological Preparations (director: candidate of medical sciences N. I. Afonin), Central Scientific Research Institute of Hematology and Blood Transfusion, USSR Ministry of Health, Moscow

[Abstract] Animal experiments represent a major part of all experimental work. They are needed to develop dosage formulation and dose-effect relations, they are used in ecological studies, in experiments on evolution of species and in search for new drugs. Two diametrically-opposed views exist as to the applicability of data obtained on animals to human situations. One of the empirical rules often quoted applies a 8-10 fold factor in transferring animal data to human applications. However, any direct transposition of animal results to humans may lead to considerable errors. Various methods of expressing the activity and calculating the transposition factors are reviewed. The most promising methods appeared to be the G. N. Krasovskiy regression method and the dosage method based on biological activity constants. References 42: 24 Russian (2 by Western authors), 18 Western.
[541-7813]

PUBLIC HEALTH

UDC 362.7:061.24(470.41)

EXPERIENCE GAINED BY INTERAGENCY COUNCIL ON HEALTH PROTECTION OF CHILDREN AND ADOLESCENTS

Moscow GIGIYENA I SANITARIYA in Russian No 12, Dec 83 (manuscript received 5 May 83) p 59

MOROZOVA, L. I., Sanitation and Epidemiology Station, Vakhitovsk Rayon, Kazan

[Abstract] Health protection of children is a state-wide concern, its success depending on cooperation of many academic institutions and organizations. To coordinate this effort, an Interagency Council was created consisting of representatives from health, education, nutrition, public safety and other interested organizations. The Council met quarterly and discussed aspects of physical education, nutrition, working and study conditions, etc. Absenteeism and prevalent diseases were analyzed. As a result of these discussions, measures were introduced to correct obvious deficiencies leading to positive dynamics in the health status of the children in this area.
[532-7813]

UDC 575.24:599.323.4

GENE MUTATIONS, CHROMOSOME ABERRATIONS AND SURVIVABILITY AFTER X-RAY IRRADIATION
OF CHINESE HAMSTER CELL CULTURE UNDER CONDITIONS OF CYSTEAMINE PROTECTION

Moscow BIOLOGICHESKIYE NAUKI in Russian No 7, Jul 83 (manuscript received
9 Apr 82) pp 92-97

YESILOVA, T. V. and FEOKTISTOVA, T. P., Institute of Biophysics, USSR Ministry
of Health

[Abstract] Experimental results were reported to the determination of protective action of cysteamine on the yield of genetic mutations, chromosome aberrations and cell kill during reproduction, evidently due to damage of genetic structures. The experiments were performed on transplanted fibroblast cells of Chinese hamsters, clone 431 in which 80% of the cells had pseudodiploidy. A dose-modifying factor of 2 was established for chromosome aberrations and cell inactivation and a factor of 2.8--for the gene mutations. The data obtained led to a conclusion that there are general protective mechanisms. They include the reaction of cysteamine on the radiation-chemical level and possible effect on the reparative processes. Figures 3; references 16: 7 Russian, 9 Western. [550-7813]

UDC: 616.127-005.8-06:616.89

MENTAL DISORDERS IN SUBACUTE PERIOD OF MYOCARDIAL INFARCTION AND THEIR TREATMENT

Moscow KLINICHESKAYA MEDITSINA in Russian No 3, Mar 84 (manuscript received 26 Apr 83) pp 49-54

[Article by Yu. A. Kuznetsov (Moscow)]

[Text] While psychopathological signs are virtually limited to exogenous psychosis and severe affective disorders in the acute period of myocardial infarction that are etiopathogenetically closely related to somatogenic influences and "independent of additional personality factors" (Yu. M. Gubachev and Ye. M. Stabrovskiy), the mental disorders that complicate the subacute period of myocardial infarction are characterized by greater clinical polymorphism and diversity of causative triggering mechanisms. The subacute period of myocardial infarction is also notable for the highest incidence of mental disorders, and this largely determines the results of the subsequent therapeutic and rehabilitation process (I. K. Shkhvatsabaya et al.). For this reason, detection and treatment of mental disorders that develop in the subacute period of myocardial infarction (2d-4th week of illness) acquire importance.

For several years, we had under our observation in the department of emergency cardiology 53 patients 53-67 years of age who had mental disorders that complicated the course of the subacute period of MI [myocardial infarction]. Most of the patients (49) were males. No psychopathological symptoms were present in the acute period of MI. Extensive transmural MI with recurrent cardiac insufficiency of the left ventricular type, impaired rhythm and conduction was diagnosed in 28 cases. Small-focus MI of diverse localization was sustained by 25 patients. We excluded from our study cases of repeated MI (their psychopathology requires special discussion). We also did not include patients whose reactions to MI were "temporary and adequate" (Ye. A. Shevalev), "normal situational" (G. K. Ushakov) and characterized by mild and transient emotional and vegetative manifestations.

On the basis of the clinical distinctions of mental disorders that developed in the subacute period of MI we divided them into two groups: psychotic and nonpsychotic.

1. Psychotic Disorders

In this group (17 patients), there was a close correlation between development of psychopathological symptoms and extensiveness of myocardial damage, recurrent

cardiac insufficiency and severity of cerebral atherosclerosis (transmural MI was observed in all patients of this group). The clinical symptoms of psychotic disturbances varied.

In four cases, mental disorders consisted of recurrent signs of mental confusion with delirious-amentive inclusions or delirious psychoses. Unlike exogenous psychoses of the acute period of MI, these mental disturbances usually arose in the evening and at night. During the day, these patients presented severe mental asthenia with signs of irritative weakness, marked hyperesthesia, rapid exhaustibility and faintheartedness, tearfulness and intensive fear of death. Special supervision was required at night for these patients, since there could be the danger of suicidal attempts against the background of their altered state.

We also observed development of rather profound depressive states associated with marked vegetative dysfunction.

Recurrent cardiac insufficiency, which complicated the course of the subacute period of MI in five patients, led to anxiety depressions that are inherent in the acute period of MI, which we have described previously (Yu. A. Kuznetsov).

In eight cases, the depressive states were endomorphous, with distinctive reduced melancholic or adynamic coloration. The absence of an endogenous radical in the premorbid period in these patients enables us to relate the distinctive signs of depressive psychosis to cerebral atherosclerosis.

Melancholic depressions (3 patients) were characterized by diminished affect background with mild daily fluctuations of affect and superficial shading of vitality, moderate ideomotor inhibition, tendency toward grumbling, peevishness, taking offense, dissatisfaction with others, combined with ideas of their inferiority and pessimistic view of the future. These patients often presented cardiophobic fixations, superficial sleep with difficulty in falling asleep, diminished appetite and asthenovegetative symptoms.

The clinical signs of adynamic depressive states (3 patients) were characterized by appearance of sadness and anxiety with vital shading of apathy, feeling of their intellectual and physical deficiency, increased fears about their condition (occasionally with egocentric sets). The patients were unwilling to comply with orders concerning physical activity, referring to their "general weakness and fatigue," which increased with "any conversation or movement." It is significant that the patients showed no melancholy, they wanted to attribute everything to "depletion," which was due, in their opinion, to ineffective treatment of their chief complaint. Apparently this caused appearance of different, brief gloomy-dysphoric reactions.

In two patients with hysterical accentuation in the premorbid period, we observed signs of deeper depression with autopsychic depersonalization. The sad, distinctly vitally colored affect with marked ideomotor inhibition, ideas of inferiority, diminished usual interests and attachments, love for close ones, which did not however reach a level of marked *anesthesia dolorosa psychica*, was combined with period anxiety reactions related to concern about their

condition. Against the background of fragmentary, derealization experiences, the somatodepersonalization disorders in both patients bore the tormenting features of "emptiness in the region of the heart." In addition, their condition was associated with exhausting insomnia.

2. Nonpsychotic Disorders

The nonpsychotic mental disorders that occurred in the subacute period of MI consist primarily of personality reactions to a serious somatic disease. Their clinical symptoms are characterized by a neurotic level of mental disturbances and close relationship to premorbid personality distinctions. With reference to etiology and pathogenesis of these mental disorders, we consider it valid to take into consideration both the somatogenic factor that creates the asthenic background (L. G. Ursova) and the psychological personality reactions to a somatic disease (I. K. Shkhvatsabaya et al., and others).

We found nonpsychotic mental disorders in the subacute period of MI in 36 cases (including 2 women). Of this number, 11 had sustained an extensive, large-focus MI and 25 a small-focus MI. On the whole, the course of MI was favorable in these patients.

The studies of recent years (A. Ye. Lichko and N. Ya. Ivanov) have established that there are diverse personality reactions to a somatic illness.

Numerous researchers, starting with Osler (V. Ye. Rozhnov and S. S. Libikh; Askans et al., and others) have described premorbid characterological features of patients with MI and ischemic heart disease: desire for leadership, self-motivation for activity, development of sense of responsibility, sthenia, ambition, arrogance and, at the same time, "low frustration tolerance," anxiety, fear, changing affect (demonstrative, pedantic, static, affectively labile accentuation according to Leonhardt). These distinctions were generally confirmed in our cases and determined the symptomatology of the nonpsychotic neurotic reactions observed in our patients, which were based on asthenia. Expressly the latter, against a background of impaired vegeto-somatic relations (F. I. Komarov et al.) caused appearance of the "depressive radical" (Dorlman), which is another basic feature of neurotic pathological personality reactions.

We observed different types of such reactions.

Asthenodepressive reactions (9 patients) were characterized by diminished affect background, but without a vital feeling, daily fluctuations of affect and its projection into the future. The patients complained of depression, rapid fatigability and anxiety when they thought about their illness, the job they had left and family. We observed primarily cardiogenically colored vegetative symptoms and difficulty in falling asleep. Patients with this type of neurotic reactions were notable in the premorbid period for a high sense of responsibility and they tolerated poorly unexpected vital problems.

In seven cases, asthenohypochondriac reactions consisted of overt exaggeration (against the background of asthenia) of the severity of their somatic condition, real symptoms and irrelevant ones that they sought out, with constant monitoring

of the "condition of their heart," requests for repeated tests and treatments, additional drugs. At the same time, they feared drug side-effects, checking carefully drug dosage and time of intake. With the tendency toward "excessive self-observation" (Petrilowitsch), these patients were verbose and, in spite of rapid exhaustion, they were irritable, readily engaged in conflicts with relatives and personnel because of seemingly insufficient attention being given to them. In their premorbid background there were elements of pedantry and demonstrativeness.

In the case of depressive-dysphoric reactions (6 patients), the typical findings were diminished affect background with prevalence of gloomy and irritable affect provoked by supposed infractions in performing therapeutic procedures, ordering new drugs and by simply seeing cheerful and healthy people. Patients with this type of reactions were overly precise in everything pertaining to their treatment and condition, fastidious, capricious, tyrannical, rude with personnel and relatives. Their sleep was superficial and brief, and they presented distinct somatovegetative disturbances. Torpid pedantry and affective rigidity were the basis of their premorbid set.

Depressive and phobic reactions were found in five patients with hypochondriac and anxiety characterological features. Their phobic (mainly thanatophobic and cardiophobic) symptoms were formed against the background of a depressive affect on the neurotic level. Fear of death, cardiac "arrest" or "cardiorrhesis," recurrent infarction or its "expansion" sometimes reached the level of passive-defense reactions (N. M. Asatiani), when the patients tried to alter even their position in bed ("if I sit up I shall die"), resisted with panic all attempts at physical activation. The phobic experiences could also extend to probable and only assumed consequences of their illness, future domestic and work loads. The fear affect was associated with marked vegetative elements: chills, hyperhidrosis, rapid respiration, tachycardia and elevation of blood pressure. All of the patients were afraid to go to sleep in the fear of dying during sleep.

Sensitive-depressive reactions were observed in three patients who had elements of torpor and arrogance in the premorbid period. An obsessive desire to retain the impression of their physical and social validity was inherent in these patients, in the presence of sad affect, distinct asthenic and vegetative disorders and complete realization of the severity of their illness. This was manifested primarily in their relations with relatives and coworkers. When meeting with them, the patients tried with all their might to "show themselves in the best light," and they were upset if, in their opinion, this did not succeed.

Egocentric reactions were observed in two patients with hysterical features in the premorbid period. Their behavior was determined by distinctive pride in their situation as a seriously ill patient. The more attention the staff paid to them, the more "solid" their consultants, the more satisfied they felt. The position of "the most serious case," conversations about their illness, about shadings of their wellbeing and the sensation of there being a "special" attitude toward them suited these patients. Jealously checking the time and degree of attention given by the staff to other patients, they became demonstratively offended when there was any "attenuation" of attention to them, reacting to this with sensorimotor (overall tremor) or vegetative (nausea, "lump" in the throat, suffocation) hysteriform disorders.

We observed euphoric-anosognostic reactions in two patients with hysterical premorbid accentuation, rather marked cerebral atherosclerosis, who had sustained the painless form of MI. The described reactions consisted of a negligent attitude toward the established diagnosis or questioning it, prevalence of euphoric affect, defiance, carefree and optimistic evaluation of the future. In spite of their generally benevolent, condescending and patronizing attitude toward personnel, the insistent appeals of the physician for an orderly regimen could elicit brief outbreaks of irritability and anger in these patients. The asthenovegetative disturbances and sleep disorders were the most persistent with this type of reactions.

A neurasthenic type of reaction was noted in two patients, whose premorbid background was the most harmonious. Clinically, they were limited to symptoms of asthenia with rapid exhaustibility, irritable weakness, cardiogenic vegetative stigmatization and agrypnia. When the personnel administered therapeutic and diagnostic measures, such patients were extremely irritable and impatient, but they soon "repented" and apologized for their "breakdowns."

Treatment of mental disorders that complicate the subacute period of MI should be planned with consideration of effects on both the mental component of MI and the patient's personality, in order to "improve its function under new conditions" (V. Ye. Rozhnov and S. S. Libikh). The combination of conservative psychopharmacotherapy and psychotherapy is the most effective in this respect. In our opinion, the statement (V. P. Zaytsev) that psychotropic therapy is of secondary value in the system of psychological rehabilitation of MI patients is unjustified for the subacute period of the disease.

The deciding value of psychotropic agents is unquestionable in the treatment of psychotic disorders in the acute period of MI. In such cases, the principles of pharmacotherapy coincide with those for the acute period of illness (Yu. A. Kuznetsov).

According to our data, it is also more expedient to start treatment of nonpsychotic disorders arising in the subacute period of MI with psychotropic agents that "open the door" (B. D. Karvasarskiy) for psychotherapy. The validity of this approach is backed up by data concerning the complete safety of psychotropic agents at the early stages of MI (I. K. Shkhvatsabaya et al.) and even the antihypoxic effect of agents in the benzodiazepine class (V. V. Zakusov).

In our cases, psychopharmacological treatment of nonpsychotic disorders required virtually no neuroleptics. We resorted to small doses of haloperidol (up to 1 mg) only in the presence of marked phobic and euphoric reactions, whereas in the presence of persistent hypochondriac symptoms we prescribed stelazine (5-10 mg/day).

Pyrazidole (100-300 mg/day) or azaphen (100-200 mg/day) intake curbed depressive neurotic reactions. The sedative effect of these antidepressants enabled us to use only small doses of benzodiazepine tranquilizers (15 mg diazepam, up to 30-40 mg rudotel, up to 1 mg/day phenazepam), if a combined effect was needed. As a rule, daytime intake of antidepressants and tranquilizers already led to disappearance of sleep disorders. In the case of persistent agrypnia (9 patients),

we additionally prescribed nitrazepam (10-15 mg) at night, or a combination of the latter with leponex (6 mg). All patients were given nootropyl (800-1200 mg/day, preferably in the morning). In some cases (in the presence of marked asthenia or high sensitivity to psychotropic agents), we prescribed sydnocarb (up to 5-10 mg) in the morning, which subjectively improved distinctly the patients' wellbeing and was never associated with somatic complications.

Pathogenetic psychotherapy administered with consideration of autoplasmic signs of the disease (R. A. Luriya), extent of experiencing the disease and its conception in a MI patient, possible iatrogenic, sororogenic, egogenic and ergotogenic disturbances was started from the first minutes after the patient arrived at the hospital and pursued the goal of maximum activation of the personality, development of "educated reaction strategy" in the patient with MI (Yu. M. Gubachev and Ye. M. Stabrovskiy).

At the start of the illness, pathogenetic psychotherapy was in the nature of "cautious psychotherapy" (in the form of approval, interest); with each successive week of MI it was expanded and had as its goal achievement of awareness in the patient of the psychological mechanisms of his disease, correction of extent of experiencing the disease, affirmation of confidence in restoration of work capacity and social status.

Of infinite importance here was the physician's ability to establish the necessary psychotherapeutic contact, which occurred only if the patient had complete confidence not only in the professional, but personality traits of the psychotherapist. The importance of psychotherapy distinctly increased when it not only contained rational and cognitive elements, but included "arguments of the heart" (Dejerine and Gauckler).

In the subacute period of MI, starting in the 3d week of hospital care, we used symptomatic psychotherapy directly aimed at alleviating symptoms that depended on psychological disorders, mainly in the form of suggestions with the patient in a waking state, with due consideration of personality distinctions of the patients. With all types of neurotic personality reactions, the results of symptomatic psychotherapy were more perceptible with use of pharmacotherapy.

Use of autotraining by the VKNTs [All-Union Cardiological Center] method (V. S. Yurdanov) for patients with phobic and neurasthenic reactions in the subacute period of MI was ineffective, according to our observations.

The results of this study are indicative of the need and importance of participation of a psychiatrist in the therapeutic and rehabilitation measures in the subacute period of MI.

Conclusions

1. Mental disorders are frequent and serious complications of the subacute period of MI.
2. In the subacute period of MI, mental disorders are manifested clinically by recurrent exogenous psychosis, endoform depressions, diverse pathological (neurotic) personality reactions.

3. For treatment of mental disorders in the subacute period of MI, there must be a combination of modern psychotropic agents and psychotherapeutic methods, with the deciding significance of psychopharmacotherapy.

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PSYCHOLOGY

PUBLIC HEALTH AND TASKS IN PSYCHOLOGY

Moscow PSIKHOLOGICHESKIY ZHURNAL in Russian Vol 5, No 2, Mar-Apr 84
(manuscript received 21 Sep 83) pp 68-75

POLYAKOV, Yu. F., Head, Chair of Neuro- and Pathopsychology, Moscow State University, Head, Department of Pathophysiology, All-Union Scientific Center of Mental Health, USSR Academy of Medical Sciences

[Abstract] The Soviet government undertook a task of health care of all citizens. The idea of a connection between the somatic and mental processes is one of the oldest concepts, yet medical psychology is one of the youngest disciplines. The subject of medical psychology is the multifaceted characteristics of the human psyche. Initially, medical psychologists were consulted only in cases of developed diseases. That was a narrow view, because one does not treat the diseases--one treats the patients. In the USSR, developments in medical psychology was realized by involving medical psychologists in public health problems. In recent years, medical psychologists were included in problems of patient rehabilitations on an increasing rate. In addition to psychological treatment, attention was recently diverted at the psychological correction, aimed at preclinical stages of the incipient disease. Further development of medical psychology will depend considerably on academic developments which will take place at the Moscow State University and at other academic institutions. References 6: Russian.
[553-7813]

POSSIBILITIES OF CREATING INVARIANT "MAN-MACHINE" SYSTEMS

Moscow PSIKHOLOGICHESKIY ZHURNAL in Russian Vol 5, No 2, Mar-Apr 84
(manuscript received 4 Apr 83) pp 76-84

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[Abstract] An important task of engineering psychology is the design of systems which, while performing their functions, could compensate for various disturbances, i.e., design of invariant systems. Invariant systems are systems with complete or almost complete functional independence of the disturbance acting on them. Three main research directions have been identified for the

invariant systems: the problem of disturbance compensation, development of methods for transferring of the controlling effects without changes and delays and development of analytical methods and syntheses of control with flexible structure. Theoretical analysis and experimental work performed on a system of observation and stabilization showed it to be possible to construct invariant "man-machine" systems (MMS). Ways and methods were planned for these invariant systems applying the concepts and methods of mutual adaptation in MMS, on the use of technical media facilitating a more complete realization of anticipation and activity, special instruction of the operators, optimization of the operational conditions, etc. The principle of invariance is closely connected with theoretical concepts of engineering psychology. References: 26 Russian (2 by Western authors).
[553-7813]

VETERINARY PROBLEMS OF INDUSTRIAL SWINE BREEDING

Moscow SVINOVODSTVO in Russian No 1, Jan 84 pp 26-28

[Article by N. Khomenko, chief veterinarian of Administration of Livestock Breeding Complexes and Experimental Enterprises of UkSSR Ministry of Agriculture]

[Text] To implement the decisions of congresses and plenums of the CPSU Central Committee, this republic has set its course toward increasing the share of industrial swine-breeding complexes and specialized farms in the overall volume of pork production.

In the Ukraine, there are many industrial swine-breeding complexes in operation in the system of the Ministry of Agriculture.

Thanks to scientific developments in the area of veterinary science, which have been made in recent years, as well as the great work of the practical veterinary service of the Ukraine, there has been considerable improvement of epizootic situation in swine breeding, morbidity has dropped, there is less loss of productivity and fewer deaths among the animals.

Having much experience in operation of large swine-breeding farms, with due consideration of prior mistakes, the increase in their capacity by 54,000 and 42,000 delivered swine per year took place on a high level. These farms have no problems with communicable diseases, and piglet loss due to such diseases does not exceed the technological level.

However, there are still several problems, including veterinary ones, in industrial swine breeding that have not been definitively resolved. They are holding back development of this sector and have an adverse effect on planned performance indicators. The chief problem are as follows: the resistance problem; gastrointestinal diseases; respiratory diseases; protection of environment against pollution by waste from industrial swine breeding (these are problems of decontamination and wise use of manure, improvement of air basin at swine-breeding complexes).

In large industrial complexes, good resistance of animals is the most important prerequisite to obtain planned productivity and preserve the animals. It is

determined by their resistance to physical, chemical and biological factors that elicit pathological states. Resistance is closely linked to the function of all organs and systems; it depends on the animal species, sex and age.

It should be stated that swine, no matter where they are raised, are exposed to many stresses varying in duration and intensity. They include temperature fluctuations, adverse microclimate parameters, unsatisfactory nutrition, transportation, frequent restlessness due to collection of blood samples, castration, overfeeding, etc.

Unfortunately, there are still infractions of technology of reproduction and raising swine at many farms and industrial type complexes, which have an adverse effect on constitutional resistance and are instrumental in raising morbidity and loss of stock. Here are some of them:

1. Not all complexes and specialized farms have yet been changed over to operation as enterprises of the closed type. Swine are delivered for replacement from many farms with different epizootic features, which often leads to new outbreaks of diseases and increased loss of piglets. One should take care of one's own reproduction (bring in only boars for pedigreed breeding).
2. The microclimate of premises is not controlled.
3. Upkeep of sows that are beyond the technological age [or quality] worsens sanitary and zoohygienic conditions, and increases bacterial contamination of premises and the environment.
4. Major infractions in the area of feeding the stock. The formulas of mixed feed put out by mixed feed plants do not conform to OST's. They are wanting in vitamins E and K, and in premixed feed there is no antioxidant, and zinc sulfate has not been added for a long time.

Feed is one of the most important environmental factors, and it has the strongest influence on animal productivity and health. If the animals' requirements of biologically proper feed can be met to some extent, animal resistance to diseases increases to the same extent also. Thus, feeding swine unsatisfactory mixed feed leads to metabolic disorders manifested by pathology.

These are the essential infractions that have an adverse effect on swine resistance and worsen the veterinary and sanitary condition of complexes. For 3 years, work has been pursued, in accordance with the program for scientific research at the Ukrainian Scientific Research Institute of Veterinary Science, on spontaneous resistance of swine at the pedigreed reproduction sovkhos-combine imeni 60th anniversary of Soviet Ukraine.

A method was developed for screening sows for breeding according to indicators of productivity and natural resistance. Recommendations on this score have been approved by the scientific and technical council of the UkSSR Ministry of Agriculture.

Gastrointestinal diseases are the second problem, which is very important to industrial swine breeding.

The studies pursued by the Ukrainian Scientific Research Institute of Veterinary Science in 1977-1983 established that coronaviruses, enteroviruses, rotaviruses and escherichia are the etiological agents that cause gastroenteritis in swine in complexes of specialized farms, against a background of feeding the animals inadequate mixed feed that was not balanced in essential nutrients and vitamins. Diseases of the gastrointestinal tract of viral etiology have a serious course when there are two or more viral agents at a farm, and colibacteriosis, dysentery, mycotoxicosis, etc., are associated with the basic infectious process and especially when there is infraction of technology of reproduction, feeding conditions, upkeep; in other words, what we call stress.

If we look at the statistical data we shall find that animals with gastrointestinal diseases at the complexes of this republic constitute 70-75% of all sick animals and loss constitutes up to 5%.

In addition to specific prophylaxis, we are working in the direction of enhancing the animals' resistance, adhering to technology of feeding and upkeep to control these diseases. We have abandoned trivitamin injections and instead add it to feed at the feed plant. After assaying actual levels of trace elements in mixed feed, we also correct any deficiency at the feed plant. In the summer time, we offer maximum amounts of green mass to the sow stock and, if it is not available, high-grade grass meal. We make extensive use of PABA, and we prepare dry acidophilus for weaned piglets and young stock to be fattened. We practice disinfection of premises on a broad scale in the presence of animals, using solutions of lactic acid and ethonium.

The strictest control has been set up of sanitary separation in all technological areas. It has been definitely determined that a 3-day sanitary separation [quarantine?] increases piglet survival by 20%, as compared to 1 day. Use of antibiotics for therapeutic purposes has been systematized (mainly in periods of nursing and fattening baby pigs), and their use abandoned for preventive purposes. An antibiotic that has been used to treat suckling pigs is not used when they are weaned.

Prevention of viral and other cases of gastroenteritis is based on strict adherence to conditions of adding stock to farms from herds with no health problems, organization of wise feeding, adherence to the principle of "everything occupied--everything vacant," and regular disinfection. It is necessary to check animals at the supplier farms for presence of virus-neutralizing antibodies.

Respiratory diseases are the next important problem in swine breeding. They constitute up to 20% of overall morbidity in this animal species at complexes in the Ukraine. In the early years of operating swine-breeding complexes, up to 70% of the stock being fattened were stricken with enzootic pneumonia. In subsequent years, thanks to the major work done at the complexes to optimize microclimate parameters, as well as improve therapeutic and preventive work, the incidence of pneumonia dropped appreciably. Its distinction is that it does not elicit a high mortality, and to some extent this comforts specialists and farmers. Yet it has an exceptionally strong effect on lowering productivity. For example, according to GDR specialists, young pigs with enzootic pneumonia that are being fattened gain an average of 50 g less daily than healthy animals.

We slaughtered a batch of fattened swine from one of the complexes at the meat-packing plant to determine the incidence of respiratory diseases. We demonstrated varying degrees of involvement of lung tissue in 70-75% of the slaughtered animals. We then slaughtered animals to make such a check at other complexes and made the same findings.

After this, we performed a thorough cleaning and flushing of exhaust ventilation underneath the floor and pulmonary diseases were reduced to a minimum.

In another farm, mass scale respiratory diseases flared up in 1983 among swine being fattened. An inspection revealed that the ducts for exhaust ventilation underneath the floor were obstructed with manure, so that there was improper function of ventilation. After eliminating the causes there were no more respiratory diseases. There are several other causes too, when incidence of respiratory diseases rises drastically due to impaired microclimate on the premises.

At the present time, work to implement recommendations for prevention of respiratory diseases among swine, which are based on suggestions to optimize microclimate parameters, should advance to the fore.

High-power fans are being installed, which remove toxic gases from deep sewer pipes through a flame ejector, in order to prevent respiratory diseases at swine-breeding complexes in Ukrainian SSR. We periodically disinfect sectors in all technological departments. At the same time, the entire reproduction and fattening shop is treated with 10% lactic acid or 1% ethonium, at the rate of $0.5 \text{ m}^2/\text{m}^3$, by the aerosol method, in the presence of animals, with simultaneous disinfection of sectors using 1% formalin or caustic soda.

We treat the farrowing sector with 10% lactic acid aerosol once a day for 7 days.

When we tested the air in the sectors before spraying aerosols, we found it was contaminated with up to 80,000 bacterial bodies per cubic meter, which dropped after treatment to 25,000 on the 1st day and 5000 microbial bodies/ m^3 on subsequent days.

Our innovators introduced the practice of warming water coming from wells at a temperature of $6-8^\circ\text{C}$ to 18°C in the automatic water trough in order to lower morbidity among suckling pigs referable to respiratory diseases.

All this will make it possible to reduce appreciably morbidity and deaths of animals, assure growth of swine-breeding product output and improve its quality.

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PREVENTION OF ANIMAL DISEASES IN INDUSTRIAL SWINE-BREEDING

Moscow SVINOVODSTVO in Russian No 1, Jan 84 pp 29-32

[Article by V. Kapustin, chief veterinarian of the Belorussian Livestock Industry]

[Text] The distinctive feature of swine breeding in our republic is the change to large-scale production, deeper specialization and change to an industrial footing. Large state, interfarm and kolkhoz complexes are being constructed; existing ones are being remodeled with consideration of use of progressive technology.

There are 76 swine-breeding complexes and farms of the industrial type operating on an industrial basis, which have more than 1 million swine. In 1982, they produced 1.2 million suckling pigs and yielded 102,000 tons pork. The experience of operating swine-breeding complexes indicates that success of industrial swine breeding depends on organization and system of labor, strict adherence to technological discipline, veterinary and sanitary conditions, coordinated action by the veterinary, zootechnical and engineering services.

The veterinary service of livestock complexes is governed in its work by the "Veterinary and sanitary rules for livestock complexes and farms of the industrial type."

Pork production on an industrial basis required that veterinary specialists adopt a somewhat different approach to disease prevention. It became more necessary to make diagnostic tests on a broader scale, both during the period of isolating swine and operating the complex. Animals that are brought in undergo routine diagnostic tests and active immunization against acute infectious diseases.

The set of veterinary measures makes it possible to detect sick animals or those suspected of being sick and not allow them to be delivered to livestock complexes.

Prevention of infectious diseases is based on having very clean conditions and adhering to sanitary rules. The large concentration of animals per unit area, upkeep without grazing and constant movement through the technological process are instrumental in accumulation of microflora in production premises.

The main prerequisites for stable operation of livestock complexes and increased animal productivity are to lower bacterial contamination of air, protect animals against infectious and conditionally pathogenic agents. Iodine aerosol use has justified itself in the presence of animals (iodinol in a dosage of 1-2 ml/m³ space). Treatment 2-3 times at 1-day intervals lowers markedly bacterial contamination of air, has a beneficial effect on piglets and lowers the incidence of gastrointestinal diseases.

Epizooty-control measures are performed by the veterinary service in accordance with elaborated plans and with consideration of the epizootic situation. In addition to biological protection, rehabilitation therapy is administered.

We have tested various vaccination programs for the prevention of infectious diseases. We found that two-fold immunization of boars and sows against plague, erysipelas and Aujeszky's disease [pseudorabies] at a 6-month interval, and inoculation of sows against colibacteriosis as near as possible to farrowing time were best. The swine-breeding complexes remain in good condition as a result of constant immunization of sows in the first month of the gestation period, diagnostic tests on boars and sows and systematic control of rodents. There are specially assigned operators who exterminate rats under the supervision of a veterinarian.

Veterinary specialists devote special attention to prevention of infectious diseases among young livestock in areas where the animals do not always have high resistance to assure development of intensive immunity. In the course of operating swine-breeding complexes, we became convinced that two-fold immunization of piglets in the supplemental feeding group against plague, erysipelas and Aujeszky's disease (first at 50-55 days and the second time at 80-85 days) provides rather intensive immunity for the entire fattening period. However, at some farms, because of low resistance of piglets, isolated cases of Aujeszky's disease were recorded after giving the second dose of vaccine against this disease. At these farms, the piglets were initially given a mixture of three vaccines (at the age of 50-55 days), then the one against Aujeszky's disease 20 days later and against plague and erysipelas at the age of 85 days. A positive effect was obtained by following this immunization program. However, there was also an increase in work load of veterinary specialists and they began to devote less attention to therapeutic and preventive measures. In view of the above-mentioned measures and instructions on use of vaccine against classical swine plague (LK), we revised the immunization program.

On the basis of the scientific research at the All-Union Scientific Research Institute of Veterinary Virology and Microbiology and BelNIEV [Belorussian Scientific Research Institute of Experimental Virology?] and with their methodological assistance, aerosol immunization of piglets was started at large swine-breeding complexes to protect them against three infections, which we administer twice at an interval of 25-30 days. As a result there is rather intensive immunity to all three infections at the age of 210-220 days. At a farm of the industrial type with 18,000 pigs, with a paratyphoid problem among piglets, we performed a scientific-production experiment with aerosol immunization of suckling pigs and sows against paratyphoid using TS-177 vaccine. As a result, no cases of piglet paratyphoid in the supplemental feeding group

have been recorded for over 1 year. The veterinary specialists at the complexes have determined that, with use of aerosol immunization, there has been an increase in labor productivity, no more cases were recorded of animals with signs of infectious diseases, incidence of pneumonia dropped among swine being fattened and average daily weight gain increased by 3-5 g. It is not enough to use only these preventive measures.

Maintaining high resistance of swine is one of the basic tasks for veterinary specialists of complexes. For this purpose, we have adopted ultraviolet irradiation of pregnant sows and piglets, installed lines for enrichment of mixed feed with vitamin-containing grass meal, trace elements, vitamins and other supplements. The feed is extruded for piglets. In the summer time, pregnant sows undergo disinfection in summer camps under natural conditions. This increased viability of newborn pigs and their survival rate.

Scientific developments and the knowhow of progressive complexes in the nation were used for prevention of diseases among piglets. We are using with success allogeous immune serum and specific immunoglobulin that is produced separately for each complex at veterinary product plants from blood serum of swine slaughtered at the meat-packing plant. Intramuscular and aerosol use of these products enhances natural resistance of piglets, attenuates the effects of stress factors, lowers piglet morbidity by 25-30% and raises their survival by 10-15%. Organization of steps to control and prevent diseases is the principal element of veterinary technology, which is based on prompt prediction of diseases when animal groups are formed. Proper evaluation of the findings permits prompt prophylaxis of diseases, increases animal productivity and makes a worthy contribution to implementation of the Food Program.

* * *

[Article continuation by V. Katasonov, chief veterinarian of the Kazakh Main Administration of Livestock Industry]

[Text] The change of swine-breeding to an industrial basis, with a high concentration of animals in small areas and the same premises has made it necessary to refine veterinary and sanitary measures and adhere strictly to hygienic rules for upkeep and feeding. In this regard, raising the level of zooveterinary sophistication in swine-breeding, organization of protection of animals against communicable and noncommunicable diseases, as well as protection of the environment against pollutants acquire particular importance.

With the intensive swine breeding in Moldavian SSR, the factors that predispose for lowering systemic resistance, immunobiological reactivity and onset of diseases are the stress involved when piglets are weaned at an early time, at 24-30 days, radical change in feeding, different regroupings of animals, unsatisfactory microclimate parameters, and there are several factors affecting the latter, one of which is the quality of the flooring.

The floor must be even, but not too smooth, soft, resilient and sturdy, with a pitch of 3-4 cm/m. It must not conduct heat and be impermeable to liquids to provide for good drainage, mainly of urine.

It is not possible to maintain the floors in proper sanitary condition in the practice of industrial swine breedings. Cracks and dents appear in the floors, urine penetrates into the subflooring and decomposes with formation of large amounts of ammonia, hydrogen sulfide and other toxic gases. The piglets start to drink the urine standing in the dents, particularly when there is not enough water and sows do not have enough milk, and this is often the cause of gastrointestinal diseases among the baby pigs.

A cage designed by the Kolkhoz Council of Moldavian SSR for sows with piglets, as well as stalls for weaned piglets, which are raised 40-50 cm above floor level (slotted flooring), were tested in the nature of a broad experiment to eliminate the above undesirable occurrences at swine-breeding enterprises of the industrial type. Tanks were installed under this flooring, which are filled with water before the animals are placed there. Excrements are pushed through the slotted floor and fall into the water, which is covered after a few days with biological film that contracts the entire water surface and prevents the toxic gases from reaching ambient air.

At the present time, the process of switching over to this progressive upkeep technology of all industrial swine breeding is near completion.

Experience has shown that when swine were kept in elevated cages placed over an air pocket with biological film, there was marked decrease in levels of ammonia, hydrogen sulfide and other toxic gases on the premises, with significant improvement of sanitation ...

[page 31 missing]

... 3. The feed is treated monthly with zinc sulfate for 3 days according to instructions on its use.

4. Vitamin E together with sodium selenite is added to feed once a day every 10 days in a dosage of 0.005 g vitamin E and 10 mg/head sodium selenite.

5. For boars (additionally):

- a) organize outings according to technological cycle
- b) check sperm for bacterial contamination every 10 days, on 10 specimens at a time
- c) make a bacteriological examination of washings from prepuce every 10 days, on 10 specimens at a time.

Section No 2 (Second Gestation Stage, Sows)

1. Trivitamin ADE is given subcutaneously in a dosage of 2.5 ml to pregnant sows (at age of 32-112 days) 50-40-20 days before farrowing.

2. Sows are to be inoculated with multivalent aluminum hydroxide formol-thiomersalic vaccine against colibacteriosis (escherichiosis) of piglets, calves and lamb twice in a dosage of 5 ml each time, first 43-45 days before farrowing and the second time 10 days after the first inoculation, i.e., 35-33 days before farrowing.

3. Three days before transferring sows to section No 3, they are disinfected using sulfadimezine in a dosage of 1 g per head or phthalylsulfathiazole in a dose of 1 g/head, or norsulfazole in a dosage of 2 g per head, 0.1% ethonium in a dosage of 30 ml/head.

4. When sows are transferred to section No 3, their integument is cleansed with disinfectants.

Section No 3 (Nursing Sows With Piglets 0-26 days old)

1. Place primipara in separate stalls when setting up farrowing units.

2. For the first 5 days after sows are transferred, the mammary gland is treated with potassium manganate solution in a dilution of 1:5000.

3. For the first 7 days in section No 3, the sows are cleaned using sulfadimezine in a dosage of 1 g/head or phthalylsulfathiazole in a dose of 1g/head, or norsulfazole in a dosage of 2 g/head, or 0.1% ethonium in a dosage of 30 ml/head. Antibiotics to which the microflora is sensitive are given at the same time.

4. On farrowing day, the piglets are given allogenic serum with added antibiotics in a dosage of 3 ml, intramuscularly.

5. For the first 3 days after birth, each piglet is given a mixture of PBK [expansion unknown] (5 ml) with 0.1% ethonium (5 ml) once a day by mouth.

6. On the 2d postnatal day, each piglet is given ferroglucin intramuscularly in a dosage of 2 ml.

7. On the 3d postnatal day, the piglets are given trivitamin ADE in a dosage of 1 ml, and a second time at the age of 6 days in a dosage of 2 ml.

8. On the 10th postnatal day, allogenic serum with antibiotics is given in a dosage of 10 ml intramuscularly.

9. A grass infusion--milfoil, horse sorrel, tansy, oak bark--as well as sulfamides and antibiotics are used for treatment and prevention of gastrointestinal diseases of piglets. They are fed roasted wheat or barley; chalk is given after the 10th day of life with trace elements, as well as red clay; from the age of 16 days they are fed grass meal in granules.

10. On the 16th postnatal day, the piglets are inoculated once with a polyvalent aluminum hydroxide formolthiomersalic vaccine against colibacteriosis (escherichiosis) of piglets, calves and lamb, intramuscularly, in a dosage of 2 ml.

11. When piglets are transferred from section No 3 to No 4, they are given 0.1% ethonium solution in a dosage of 5 ml with 5 ml PBK added, by mouth.

Section No 4 (Weaned Piglets, 27-106 Days Old)

1. When placing pigs in section No 4, they are given ferroglucin intramuscularly in a dosage of 2 ml + 2 ml 2.5% aminosin.
2. For the first 8 days of feeding piglets on the floor, one of the following drugs is added to the feed (per 100 kg feed): kormogrizin--60 g, furazolidone--40, sulfadimezin--200, trichopol [flagyl]--500, vetdipossfen--300 g.
3. On the 8th day, the piglets are treated with nonspecific globulin or other serum preparations in a dosage of 4 ml, with concurrent administration of antibiotics (streptomycin + penicillin).
4. Mixed feed with addition of osarsal in a dosage of 0.1 g/head or trichopol in a dosage of 0.5 g/head, or other antibiotics and sulfanilamides are added once a day for 3 consecutive days manually into the feeders 3 days before switching the piglets to SK-22 feed.
5. As the feed is pumped through the worm-conveyer into the feeders, biofusol is added in a dosage of 2 kg/ton feed for 3 days, or other antibiotics and sulfanilamides.
6. Sick and weak baby pigs are put in separate cages, with improved feeding and upkeep conditions, and they are treated individually.

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EXPERIENCE IN ORGANIZING VETERINARY MEASURES AT A COMPLEX

Moscow SVINOVDSTVO in Russian No 1, Jan 84 pp 33-34

[Article by L. Kutuzov, chief veterinarian at the Sovkhoz-Combine imeni 60th Anniversary of Belorussian SSR, Borisovskiy Rayon, Minsk Oblast]

[Text] Veterinary services at a complex are an inseparable part of the technological process and have one basic purpose, to assure welfare with regard to diseases and increase animal productivity. Veterinary treatment and prevention of diseases, both infectious and of noncommunicable etiology, are performed in each technological group at times that are determined by the raising period.

A mandatory condition for stable operation of a complex is to have it furnished with livestock free of infections. This is achieved by raising gilts at the pedigreed breeding farm of the sovkhaz-combine. Before they are transferred to the complex, a full set of diagnostic tests is performed, as well as active immunization against acute infectious diseases, leptospirosis, pasteurellosis, sanitary and hygienic treatment of integument and hooves.

Implementation of these measures and a clinical examination of the animals permits detection of all sick or suspect animals, without allowing them to be brought to the complex. The young pigs are brought to the combine at the age of 260-270 days with a weight of 115-125 kg.

The high concentration of animals and their upkeep without grazing, as well as constant movement from one place to another compel us to adhere strictly to the technological process and rhythm of production. The entire herd is divided into the basic technological groups. They are serviced by permanent animal-care operators who have the necessary skills and are familiar with veterinary and sanitary rules.

Earliest possible forecasting of diseases, monitoring metabolism of boars and sows constitute the principal means of preventing noncommunicable diseases. For this purpose, a group of sows is taken every 15 days from the section where barren and conditionally pregnant sows are kept, and blood is drawn from them monthly for biochemical tests. This permits checking metabolism and, in case of change in it, taking the necessary steps.

The main direction of disease prevention is to enhance the animals' natural resistance. For this purpose, they are given vitamins once before insemination

and twice in the last month of the gestation period. The sows are given vitamin-containing grass meal in a dosage of 200 g/head, 20 g cod liver oil and, for 30 days prior to farrowing, 2 g ascorbic acid daily. These steps improve significantly the indicators of nonspecific immunity of sows, viability of their offspring and their resistance to dyspepsia. On the 112th day of the gestation period, the sows are transferred to the farrowing section in a carefully prepared sector. Before installing them, they are washed thoroughly with warm water and sprayed with 1% SK-9 solution. To prevent constipation, their feed norm is removed and they are given Glauber's salt at the rate of 50-100 g/head for 5 days. The sows are given phthalylsulfathiazole at the rate of 5 g/head or, if none is available, antibiotics with vitamin C in feed 2 days before and 3 days after farrowing.

On the first postnatal day, the piglets tusks are split off, their tails are amputated and they are given infusions of coliprotectan or 5-10 ml gastric juice with vitamin C to prevent enteritis. We have noticed that some piglets develop vomiting on the 2d-4th postnatal day. Latent mastitis was discovered when the mothers of such piglets were examined. The sow usually lies on her abdomen and does not allow the piglets to suckle. If immediate steps are not taken to treat such sows, the baby pigs develop debilitating diarrhea that leads to their death. At the age of 2-3 days, suckling pigs are given a mixture of ferroglucin and trivitamin. Antibiotics are used to treat piglets only after determination of sensitivity of microflora to them, which is done individually for each sector. The piglets are weaned at the age of 26 days. The first 10 days after weaning are the most dangerous for the piglets. To prevent enteritis in this period, a medicinal mixture is added to the piglets' feed from the 2d to 8th days after weaning, which consists of furasolidone, sulfadimezin, iron glycerophosphate, vitamin U and multiple vitamins.

From the age of 26 to 60 days, the piglets are given SK-15 mixed feed. To enhance natural resistance and prevent rickets, the animals are exposed to ultraviolet light up to the age of 60 days.

Piglets presenting retardation of growth are given trivitamin injections on the day they are weaned, in mixture with ferroglucin, in a dosage of 4 ml/head. This mixture of drugs is given to them by mouth from the 2d to 8th day after weaning.

In addition, vitamin U in a dosage of 3 mg/kg weight is given in the Pig-Baliya sectors together with milk, daily, for the entire raising period. All these steps reduced morbidity in young pigs to less than one-half, as compared to the first years of running the complex.

Epizootic-control measures are performed at the complex with due consideration of the technological process. Sows are inoculated against plague, Aujeszky's disease, erysipelas, pasteurellosis, leptospirosis and colibacteriosis; piglets are immunized against Aujeszky's disease and erysipelas by the aerosol method. We also inoculate piglets against pasteurellosis in view of a complicated epizootic situation.

Sanitary measures also play a large role in disease prevention. After moist disinfection at the combine using 4% caustic soda, formalin aerosol is used.

The sovkhos laboratory constantly checks the quality of the treatments; 1% chlorofos with 1% caustic soda has been used with success for disinfection in the presence of animals. The adhesive paste, Mukholov [flycatcher] is used in the premises for boars and suckling pigs.

Constant work to improve therapeutic and preventive measures, as well as strict adherence to technological discipline, have enabled this sovkhos-combine to fulfill the state plan each year.

The mean daily weight gain per animal last year constituted 500 g for the complex, 201 g for suckling pigs, 354 for weaned piglets and 676 for swine being fattened.

These indicators could have been even higher if the combine had regularly received a high grade of feed in accordance with technology. Drugs are also being supplied inadequately, particularly those used for prevention of pneumonia, enteritis and dysentery.

* * *

[Article continuation by V Lushchenko, chief veterinarian of the Prikarpat'skiy Swine-Breeding Complex, Kalush'skiy Rayon, Ivano-Frankovsk Oblast]

[Text] The Prikarpat'skiy Sovkhos-Combine is an industrial enterprise for fattening 54,000 swine per year. The enterprise is situated 10 km away from the city of Kalusha in Ivano-Frankovsk Oblast.

Construction of the swine-raising complex was started with a pedigreed reproducer, which was started up in December 1979 and reached the projected parameters of technological indicators in 1981. To form the pedigreed reproducer stock, 700 large white pigs were delivered from the sovkhos-combine imeni 60th Anniversary of Soviet Ukraine, in Dnepropetrovsk Oblast.

The animals acclimatized themselves poorly, there were mass scale injuries to their hooves, erosion of sole callus, for which reason the animals were rejected.

Laboratory blood tests failed to reveal any changes. The entire herd was given intramuscular injections of 10 ml calcium gluconate twice at a 10-day interval. Virtually all of the pedigreed animals were inseminated when they weighed 130-140 kg and became pregnant. The offspring of primipara sows also presented the above clinical signs, but by giving them calcium gluconate in a dosage of 5 ml it was possible to arrest the disease (calcium chloride was ineffective). This disease was not encountered at the farm thereafter.

From the very first days of our work, we noticed that some sows kept under the same conditions and inseminated by the same sires gave birth to piglets that did not contract gastrointestinal diseases.

This suggested to us that one should select pedigreed sows, with consideration of natural resistance of parents, to form the stock of sows at the complex. This is very time-consuming work, and we have been doing it for 3 years already.

The swine-raising complex was started up in May 1982, and already in 16 months it has a full stock of sows due to the pedigreed reproducer, 26,000 piglets were obtained and 2700 tons of pork have been sold to the government.

A system for washing off with water exists at the complex only in the third and fourth sections, with transporters in the rest of the premises. In the first section (where animals are mated) the air had a very high dust content, so that water mixers were additionally installed for semiwet removal of manure and to groom the sows. According to the plan, the illumination in the sty is so arranged that the sow's reproductive organs are virtually unexposed to light, which made it difficult for operators to determine whether they were in heat and to be inseminated. For this reason, the lighting system was altered and shifted to the back walls of the stalls. This improved working conditions for the technicians and reduced by 2% instances of missing the rut period.

An electric heater with constant water temperature of 38°C at the base of the sterilizer for the vagina was installed to heat the POS-5. Heat was stimulated in the sows by means of a test boar; we also use vitamins.

We place the test boar in a separate stall to which the sows have free access.

In the summer, particularly on hot days, many of the boars at the artificial insemination station presented necropermia and aspermia. In such cases, a cold shower is very effective before mating and on hot days.

For better development of piglets with retarded growth fed on the floor using standard feed in the fourth section sectors, instead of dry feed we give mixed feed moistened with water and cod liver oil in the form of gruel for the first 10 days, which increases appreciably the amount of feed consumed, diminishes thirst and prevents mass scale digestive disorders in the piglets.

In addition, the personnel of the sovkhos-combine are working to improve indoor microclimate and in the area of artificial irradiation of the animals.

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VIROLOGY

HIGH REPRODUCIBILITY OF HUMAN INFLUENZA VIRUS H3N2 RECOMBINANTS WITH AVIAN PLAGUE VIRUS DETERMINED BY GENE CODING FOR M PROTEIN

Bratislava ACTA VIROLOGICA in Russian Vol 27, No 5, Sep 83 (manuscript received
22 Jul 82, after final revision, 18 Jan 83) pp 434-438

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[Abstract] Recombinants were successfully obtained between low yielding strains
of human influenza virus (A/Victoria/3/75 and A/Bangkok/1/79) and high yielding
avian plague virus (APV) which were high yielding in chick embryos (CE). It
was shown that the gene coding for M protein transmitted to the recombinant the
ability to reproduce well in CE, thus the M gene was shown to play the determin-
ant role in transferring high yielding ability of the influenza virus. Con-
current transmission of other genes may lead to optimization of this process
but it would not be the primary factor responsible for the high yield.
Figures 2; references 9: Western.

[509-7813]

BIOLOGICAL ACTIVITIES OF STRUCTURAL PROTEINS OF JAPANESE ENCEPHALITIS VIRUS

Bratislava ACTA VIROLOGICA in Russian Vol 26, No 5, Sep 82
(manuscript received 5 Aug 81, final draft received 4 Feb 82) pp 312-320

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[Abstract] Structural proteins V1, V2 and V3 of Japanese encephalitis virus
(JEV) were completely isolated by electrophoresis in polyacrylamide gel in the
presence of sodium dodecylsulfate; antisera against these individual structural
proteins were found to be clearly monospecific with regard to antigens used
during immunization. Purified V3 protein in the presence of sodium dodecyl-
sulfate did not attach to erythrocytes, and, antiserum to it did not produce
hemagglutination-inhibiting antibodies or neutralizing activity. Renaturated
V3 protein of JEV had an affinity for erythrocyte receptors in JEV. It had

the capacity to adsorb hemagglutination inhibiting antibodies and neutralizing antibodies. The results indicate that V3 protein plays a vital role in virus infection. Antibodies and V1 protein have only slight virus-neutralizing activity while V2 protein has none. These results can be used in studies of biosynthesis and modification of structural proteins in cells infected by Japanese encephalitis virus. Figures 6; references 22: 4 Russian, 18 Western. [540-2791]

DIFFERENCES IN BIOLOGICAL ACTIVITY OF V3 PROTEIN OF EXTERNAL MEMBRANE OF TWO STRAINS OF JAPANESE ENCEPHALITIS VIRUS

Bratislava ACTA VIROLOGICA in Russian Vol 26, No 5, Sep 82 (manuscript received 11 Aug 81; final draft received 4 Feb 82), pp 321-327

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[Abstract] Biological and serological analyses of highly purified and re-naturalized V3 proteins of Nakayama-NIK and JaGAR-01 strains of Japanese encephalitis virus showed significant differences in their composition and biological activity. Analysis of the amino acid composition of V3 protein showed it to be rich in glycine and alanine but relatively low in some other basic amino acids. A difference in the level of serine, histidine, proline and tyrosine in V3 protein of Nakayama NIH strain from that in JaGAR-01 strain was noted but these differences could not be correlated with biological functions of V3 protein of the external membrane. Differences of structure of the V3 proteins were assumed to be responsible for differences in their antigenicity and capacity to react with antibodies. The V3 protein of JaGAR-01 absorbed strain-specific antibodies from anti-JaGAR-01 serum and cross-reacting antibodies of anti-Nakayama-NIH serum. The V3 protein of Nakayama-10 also absorbs cross-reacting antibodies from serum against JaGAR-01 but cannot absorb strain-specific antibodies to Nakayama strain in serum against Nakayama strain. These data show clearly that strain-specific and cross-reacting antigenic determinants are present in V3 protein molecules of both strains of Japanese encephalitis virus. Figure 1; references 13: 2 Russian, 11 Western. [540-2791]

HYPOREACTIVITY, INDUCED IN VIVO IN CFLP MICE BY SENDAI VIRUS

Bratislava ACTA VIROLOGICA in Russian Vol 26, No 5, Sep 82 (manuscript received 10 Feb 82) pp 346-352

MÉCS, I. and KOLTAI, M., Department of Microbiology, Department of Pharmacology, University Department of Medicine, Seged, Austria

[Abstract] Intravenous injection of Sendai virus into 8-week old CFLP mice caused pronounced increase of interferon induction in the blood, with a peak 6 hours after injection and an abrupt decrease with virtual disappearance 48 hours after the injection while intraperitoneal injection of Semliki forest virus increased the rise of interferon induction much more slowly. Both viruses suppressed acute inflammatory reaction caused by carrageenan. The hyporeactive state reached 48 hours after injection was characterized by absence of interferon induction and by extinction of the virus-induced anti-inflammatory effect while the antiinflammatory effect of indometacin and dexametazone remained unchanged. Sendai virus injection caused pronounced granulocytosis and lymphopenia. Leukocytosis was found in hyporeactive mice. Repeated injections of Sendai virus produced less-pronounced granulocytosis. The changes in mice after Sendai virus injection may serve as a model of the hyporeactive state arising in vivo. Figures 2; references 13: Western. [540-2791]

PERSISTANCE OF TICK ENCEPHALITIS VIRUS AFTER INFECTION OF MONKEYS IV. LOCATION OF THE VIRUS AFTER INTRACEREBRAL INJECTION

Bratislava, ACTA VIROLOGICA in Russian Vol 26, No 5, Sep 82 (manuscript received 4 Nov 81, final draft received 19 Feb 82) pp 362-368

MALENKO, G. V., FOKINA, G. I., LEVINA, L. S., MANONENKO, L. L., RZHAKHOVA, O. Ye., POGODINA, V. V. and FROLOVA, M. P., Institute of Poliomyelitis and Virus Encephalitides, USSR Academy of Medical Sciences, Moscow

[Abstract] Infectious tick encephalitis virus was isolated from brain, spinal cord, blood, liver, inguinal lymph nodes and kidneys after development of acute or subacute lethal encephalitis in 26 rhesus monkeys. Virus titers in the central nervous system were lower during subacute encephalitis than during acute encephalitis. Location of tick encephalitis virus in chronic encephalitis was about the same in the acute and subacute forms of the disease. Infectious tick encephalitis virus was isolated from the subcortical ganglia and spinal cord of a monkey with chronic encephalitis and paralysis of the front paw on the 383rd day. Specific fluorescence was detected in these same sections of the central nervous system and the virus was isolated by cocultivation; it was detected in the lymph node and spleen. Studies of monkeys with chronic encephalitis on the 90th day after infection, in remission, revealed no virulent virus in the central nervous system nor the internal organs. Virus specific antigen was found in all sections of the brain, spinal cord, spleen, liver, kidneys and lymph nodes studied by the fluorescing antibodies method. Figures 3; references 16: 9 Russian, 7 Western. [540-2791]

PERSISTENCE OF TICK ENCEPHALITIS VIRUS AFTER INFECTION OF MONKEYS
V. LOCALIZATION OF THE VIRUS AFTER SUBCUTANEOUS INFECTION

Bratislava ACTA VIROLOGICA in Russian Vol 26, No 6, Sep 82 (manuscript received 3 Dec 81, final draft received 19 Feb 82) pp 369-375

FOKINA, G. I., MALENKO, G. V., LEVINA, L. S., KORESHKOVA, G. V., RZHAKHOVA, O. Ye., MAMONONKO, L. L., POGODINA, V. V. and FROLOVA, M. P., Institute of Poliomyelitis and Virus Encephalitis, USSR Academy of Medical Sciences, Moscow

[Abstract] Distribution of tick encephalitis virus in some organs of 28 monkeys after subcutaneous infection by strains Vasil'chenko, Ayna/1448 and 41/65 and mutant Pan-114 is described and discussed. Tick encephalitis virus and virus-specific antigen were found at various periods of asymptotic infection for up to the 302nd day of a 620-day study in the central nervous system, liver, spleen, lymph nodes and kidneys. Use of the immunodepressant cyclophosphane produced no significant changes in virus distribution with the exception of more frequent isolation of virus from the kidneys in the early period and from the spleen in the later period. Infectious virus was found in the spinal cord on the 3rd-6th day, in the cerebellum and subcortical ganglia on the 11th-14th day and in the cerebral cortex on the 19th day whether or not cyclophosphane was used. Virus was isolated from the central nervous system more frequently than from the internal organs in the early period while persistent virus or virus-specific antigen was found predominantly in the internal organs in the later period (93-302-day). Figures 3; references 20: 11 Russian, 9 Western. [540-2791]

USE OF FLUORESCING ANTIBODIES METHOD TO IDENTIFY DENGUE VIRUS IN INFECTED TISSUES

Bratislava ACTA VIROLOGICA in Russian Vol 26, No 5, Sep 82 (manuscript received 10 Mar 82) pp 376-381)

WATERMAN, S. H. and MONATH, T. P., Department of Health and Human Services, Vector-borne Viral Disease Division, Fort Collins, Colorado, USA

[Abstract] Sensitivity of immunofluorescence methods was assessed by comparing the biotin-avidine system, using antiviral antibodies; biotin, bound with biotinyl-anti-IgG and fluorescent isothiocyanate-labelled avidine, with standard direct and indirect methods in experiments to detect virus antigen in frozen sections of brain of suckling mice, infected with dengue virus. The end antibodies titers after use of the biotin-avidine method was 2-8 times higher than those obtained by the other 2 immunofluorescence methods studied. The biotin-avidine method is recommended for use for rapid post-mortem diagnosis of some fatal dengue hemorrhagic fevers and dengue shock syndrome and for early diagnosis of dengue fever by study of the leukocytes or by biopsy. Figure 1; references 13: Western. [540-2791]

COMPARATIVE STUDY OF MULTIPLICATION OF VACCINE AND VIRULENT STRAINS OF
RICKETTSIA PROWAZEKI IN CELLS OF TRANSPLANTABLE LINES AT VARIOUS TEMPERATURES
OF CULTIVATION

Bratislava ACTA VIROLOGICA in Russian Vol 26, No 5, Sep 82 (manuscript received
30 Dec 81, final draft received 8 Mar 82) pp 390-394

GUDIMA, O. S., Institute of Epidemiology and Microbiology imeni N. F. Gamalaya,
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[Abstract] Significant differences in the nature of intracellular development
of various strains of *R. prowazeki* under identical conditions of cultivation
were established. The virulent strain Breinl multiplies in McCoy and B cells
at 30-40°C with peak accumulation at 35°C. In FL cells, it multiplies at
30-38.5°C with a peak at 35-37°C but is depleted at 40°C within 10 days.
Vaccine strain E of *R. prowazeki* cannot continue to multiply in FL cells, even at
35.8°C. It does not multiply at 40°C in McCoy, B or FL cells, i.e., it has a
ts-phenotype and may be defined as a ts-mutant. The new genetic characteristics
observed (hr and ts) for vaccine strain E may be of great importance in explain-
ing the nature of attenuation or virulence of *R. prowazeki*, References 13:
4 Russian, 9 Western.
[540-2791]

ISOLATION OF TICK ENCEPHALITIS VIRUS FROM PATIENT WITH MULTIPLE SCLEROSIS

Bratislava ACTA VIROLOGICA in Russian Vol 26, No 5, Sep 82 (manuscript received
10 Jun 81, final draft received 22 Oct 81) p 403

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Moscow

[Abstract] Virological study of 40 patients with multiple sclerosis led to
isolation of tick encephalitis virus from two of them (An., age 28 and May.,
age 18) repeatedly for a period of 3 months although there were no data
indicating tick encephalitis in the anamneses. Intracerebral injection of a
10 percent suspension of blood clots from these patients, in physiological
solution, into 6-7 g mongrel mice caused illness in 2 mice after the first
subinoculation and clinical signs of tick encephalitis in all infected mice on
the 4th to 5th day after the second subinoculation. Material from the other
multiple sclerosis patients did not produce illness. Electron microscopic
study of ultra-thin sections prepared from brain of suckling mice infected by
material of the second subinoculation revealed virus particle morphologically
similar to flaviruses. Morphological and antigenic properties of the viruses
isolated from An. and May. during multiple sclerosis indicated that they are
viruses of a tick encephalitis complex. References 6: 1 Russian, 5 Western.
[540-2791]

EXPERIMENTAL INFECTION OF ORGAN CULTURES OF PANCREAS OF WHITE SUCKLING MICE
BY TICK ENCEPHALITIS VIRUS AND SINDBIS VIRUS

Bratislava ACTA VIROLOGICA in Russian Vol 26, No 5, Sep 82 (manuscript received
27 Nov 81) p 405

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Slovakian Academy of Sciences, Bratislava, Czechoslovakia

[Abstract] Study of white suckling-mouse pancreas fragments infected by tick
encephalitis virus of Sindbis virus showed that tick encephalitis virus pro-
duced a peak of infectious progeny by the third day after infection and was
found in the organ cultures up to the tenth post-infection day while Sindbis
virus was not reproduced in the pancreas fragments. These results indicate
that suckling-mouse pancreas fragments may be used to study the interaction of
togaviruses and pancreatic tissue. References 10: Western.
[540-2791]

TAHYNA VIRUS IN SECTORS AROUND BRATISLAVA

Bratislava ACTA VIROLOGICA in Russian Vol 26, No 3, Sep 82 (manuscript received
20 Jan 82) p 407

LABUDA, M. and KOZUCH, O., Institute of Virology, Slovakian Academy of Sciences,
Bratislava, Czechoslovakia

[Abstract] Study of suspensions of 992 *A. vexans* mosquitos, trapped in the
Bratislava region from mid-August to the end of September 1981, revealed five
strains of Tachnia virus. The minimum degree of natural infectivity was
1:198 as compared to 1:1234-1:8574 for *A. vexans* in southern Slovakia, according
to a previous study, and 1:753-1:6489, with an average of 1:1685, for southern
Moravia from 1962-1971. The study showed a high degree of infectivity of
mosquitos by Tachina virus in older regions, new constructions and suburban
rest zones. The possibility that the results of this study are an exception
to the rule should be confirmed in future tests. References 5: Western.
[540-2791]

SWINE VESICULAR DISEASE VIRUS PLAQUE MORPHOLOGY IN RELATION TO PATHOGENICITY
FOR NEONATAL MICE. PART 2. TEMPERATURE-DEPENDENT MUTANTS AND THEIR CLONES

Bratislava ACTA VIROLOGICA in Russian Vol 27, No 3, May 83 (manuscript received
8 Mar 82; in final form 30 Jun 82) pp 223-227

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[Abstract] Tissue culture and mice infection studies were conducted to correlate
plaque size, incubation temperature and pathogenicity characteristics of swine

vesicular disease virus (SVDV). Incubation of IBRS-2 tissue cultures infected with three wild strains of SVDV at 27, 32, 37 and 42°C resulted in the isolation of temperature-dependent SVDV mutants with an optimum growth temperature at the indicated incubation temperature, and which differed in pathogenicity for suckling mice and plaque size. Largest plaques were obtained at 42°C (1.92-2.64 mm), intermediate-sized plaques at 37°C (1.78-2.33 mm), smaller plaques at 32°C (1.36-1.48 mm), and smallest plaques at 27°C (1.12-1.19 mm). Mutants growing at 42°C and producing the largest plaques were most virulent for the mice, with virulence abating with lower temperature requirements and smaller-sized plaques. SVDV mutants growing at 27°C were avirulent and their plaques were comparable with the plaques produced by a nonpathogenic strain (1-1.1 mm); both persisted in murine brains for 20 days after infection without signs of illness. References 13: 1 Russian, 2 Polish, 10 Western.
[539-12172]

EFFECTS OF TICK-BORNE ENCEPHALITIS AND WESTERN NILE VIRUSES ON PORCINE KIDNEY CELL CHROMOSOMES

Bratislava ACTA VIROLOGICA in Russian Vol 27, No 3, May 83 (manuscript received 27 Jul 82) pp 238-244

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[Abstract] Viral effects on mitotic activity and chromosomal status were studied in porcine kidney cell tissue culture infected either with tick-borne encephalitis (TBE) virus, strains Hypr (prototypic) and Ir-32, or with Western Nile virus, strains K-99 and E-13 (prototypic). Within 4 h of infection the mitotic index of the cells showed a significant increase (with the exception of K-99-infected cells), and the increase in the number of metaphases was assumed to result from a metaphase barrier. Concomitantly, the viral titers began to decrease. After 8-12 h the mitotic index showed a sharp decrease. Cells infected with TBE viruses showed a marked increase in the number of metaphases with slow chromosomes (more than 50% of the total anomalous forms). The West Nile viruses induced the appearance of metaphases similar to those induced by colchicine (which accounted for more than 40% of the anomalous forms). In addition, the Hypr virus was found to alter the mitotic apparatus and the chromosomes to a lesser degree than the newly-isolated Ir-32 virus. Figures 3; references 10: 1 Czech, 5 Russian, 4 Western.
[539-12172]

EXPERIMENTAL STUDIES ON TRANSOVARIAL TRANSMISSION OF TAHYNA VIRUS IN AEDES
AEGYPTI MOSQUITOES

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5 Jul 82) pp 245-250

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[Abstract] Experimental studies on transovarial transmission in the mosquito
Aedes aegypti involved 50 mosquitoes fed on 2-4 day old mice with Tahyna
viremia, of which 31 mosquitoes (62%) became infected. Examination of 1587 F₁
progeny revealed 16 infected females derived from 7 of the 31 maternal mosquitoes.
Electron micrographic examination of the infected F₁ progeny revealed the virus
in the cytoplasm of maturing oocytes no earlier than the second gonotrophic
cycle. Such progeny, however, failed to transmit the virus to neonatal mice
when permitted to feed on them. These studies confirmed the transovarial
transmission of the Tahyna virus in mosquitoes, and the replication of this
virus in the maturing oocytes. Figures 4; references 17: 2 Russian, 15 Western.
[5 39-12172]

STUDIES ON ANTIGENIC STRUCTURE OF COXIELLA BURNETII

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30 Jul 82) pp 263-267

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[Abstract] Serologic adsorption studies were carried out with animal and human
sera possessing antibodies against natural and chemically-induced (K10₄) phase
II *Coxiella burnetii* to further define the antigenic structure of these
rickettsial organisms. The studies, involving guinea pig and rabbit antisera
and immune human serum obtained from a case of Q fever, showed that neither
the natural nor laboratory-induced phase II preparation was capable of removing
all of the antibodies reacting with the other phase II organism in micro-
agglutination and complement fixation tests. These observations indicate that
the antigenic structure of *C. burnetii* is more complicated than previously
believed, and may account for the serologic differences observed in studies
on natural phase II *C. burnetii* and chemically-induced phase II cells.
References 13: 6 Russian, 7 Russian.
[539-12172]

MULTIPLICATION OF RICKETTSIA PROWAZEKII IN COTTON RAT MACROPHAGE CULTURE

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[Abstract] Comparative studies were conducted on the ingestion and persistence of *Rickettsia prowazekii* in cotton rat and guinea pig peritoneal macrophage cultures. Infection of the cultures with high doses of the rickettsiae (10^4 EID₅₀) resulted in the presence of the pathogen in 40% of the guinea pig cells and in almost 90% of the rat macrophages after 5-7 days. In addition, the pathogen persisted in the rat cells for 19 days without any cytopathic effects, while persistence in the guinea pig macrophages did not exceed 7-9 days. The end result in both cases was dissolution of the cells and death of the rickettsiae. Low doses (10^2 EID₅₀) failed to infect the guinea pig macrophages but infected the rat macrophages. The studies on the macrophages parallel clinical observations on infected guinea pigs and cotton rats, in that the former are relatively resistant to infection while the latter are readily infected and sustain the infection for long periods of time without ill effects. Figures 4; references 7: 4 Russian, 3 Western.
[539-12172]

REPRODUCTION OF LASSA VIRUS IN VARIOUS CELL LINES

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[Abstract] A number of continuous cell lines were tested for their susceptibility to the Sierra Leone strain of the Lassa virus, in order to expand the number of cell lines available for studies with this virus which are currently done with Vero cells. The results demonstrated that the Lassa virus readily multiplied in, in addition to Vero cells, L cells, porcine kidney cells, diploid cells derived from the human embryonic lung and in primary kidney cells from the human embryo to yield titers of 10^5 to 10^6 PFU/ml. In addition, the fluorescent antibody method demonstrated the presence of Lassa antigens in 80% of the cells belonging to these lines. Lower Lassa titers (10^4 to 10^5 PFU/ml) were obtained with BHK-21, MDCK, CV-1, HeLa, FL and HEP-2 cells, and the virus failed to multiply in chick embryo primary fibroblasts. In studies involving agar overlay, plaque formation was observed only in the case of the CV-1 and Vero cells. Figures 3; references 10: 3 Russian, 7 Western.
[539-12172]

EASTERN EQUINE ENCEPHALOMYELITIS VIRUSES ISOLATED IN CUBA

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[Abstract] Serologic studies (hemagglutination, hemagglutination inhibition) were carried out on serotyping Eastern Equine Encephalomyelitis (EEE) viruses isolated from various animals to determine their relationships to the North American (NA) and South American (SA) serotypes. Two EE strains isolated in Cuba (from *Capromys pilorides* and *Equus caballus*) were serotyped as belonging to the NA group, while one strain isolated from *Eudocimus albus* belonged to the SA group. Based on reported findings in the USA, the present results indicate that the NA serotypes may have natural foci in the subtropical regions of Cuba, while the SA serotype may have been imported by migratory birds.

References 3: Western.

[539-12172]

SWINE VESICULAR DISEASE VIRUS PLAQUE MORPHOLOGY IN RELATION TO PATHOGENICITY FOR NEONATAL MICE. PART 1. WILD-TYPE STRAINS AND THEIR CLONES

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[Abstract] Studies on wild-type swine vesicular disease viruses cultured on IBRS-2 cell cultures (piglet kidney cells) revealed considerable heterogeneity manifested as production of variably-sized plaques. For three different isolates the percentages of large (5-9 mm), medium (3-4 mm) and small (1-2 mm) plaques ranged from 44-61%, 0-40%, and 16-39%, respectively. Subcutaneous injections of viruses cloned from the different plaques into 1 day-old Swiss mice showed that viruses isolated from the larger plaques had greater pathogenicity for the mice than isolates from the smaller plaques, with a correlation coefficient of +0.94 between plaque size and LD₅₀ value. Two parameters useful in the estimation of pathogenicity were the dose index ($DI = (TCID_{50}/LD_{50})$) and the index of theoretical pathogenicity ($ITP = DI_s/DI_l$; $DI_s = DI$ of small-plaque clone and $DI_l = DI$ of large-plaque clone). Figures 4; references 23: 1 Russian, 6 Polish, 16 Western.

[539-12172]

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14TH ALL-UNION CONGRESS OF PHYSIOLOGISTS

Riga IZVESTIYA AKADEMII NAUK LATVIYSKOY SSR in Russian No 2, 1984 pp 129-131

KRAUKLIS, A. and KAZANOVSKAYA, I.

[Abstract] The 14th Congress of the All-Union Physiological Society imeni I. P. Pavlov was held on September 26-30, 1983 in Baku. It was attended by more than 1700 participants, including guests from Hungary, GDR, Bulgarian and Czechoslovakia. The meeting was organized into two plenary sessions consisting of the presentation of six review papers, 34 lectures, and 54 symposia at which 460 reports were presented. The Congress also included 616 poster sessions, round table meetings, and the demonstration of eight scientific films. The main theme of this Congress, in distinction to the preceding one held in Alma-Ata in 1979, was human physiology in its various aspects. The Congress concluded with the election of a new governing body for the Society, in which Academician O. G. Gazenko was elected chair of the Society and Academician O. S. Adrianov vice-chair.
[526-12172]

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